AUG. 1934

MODERN MECHANIX and INVENTIONS

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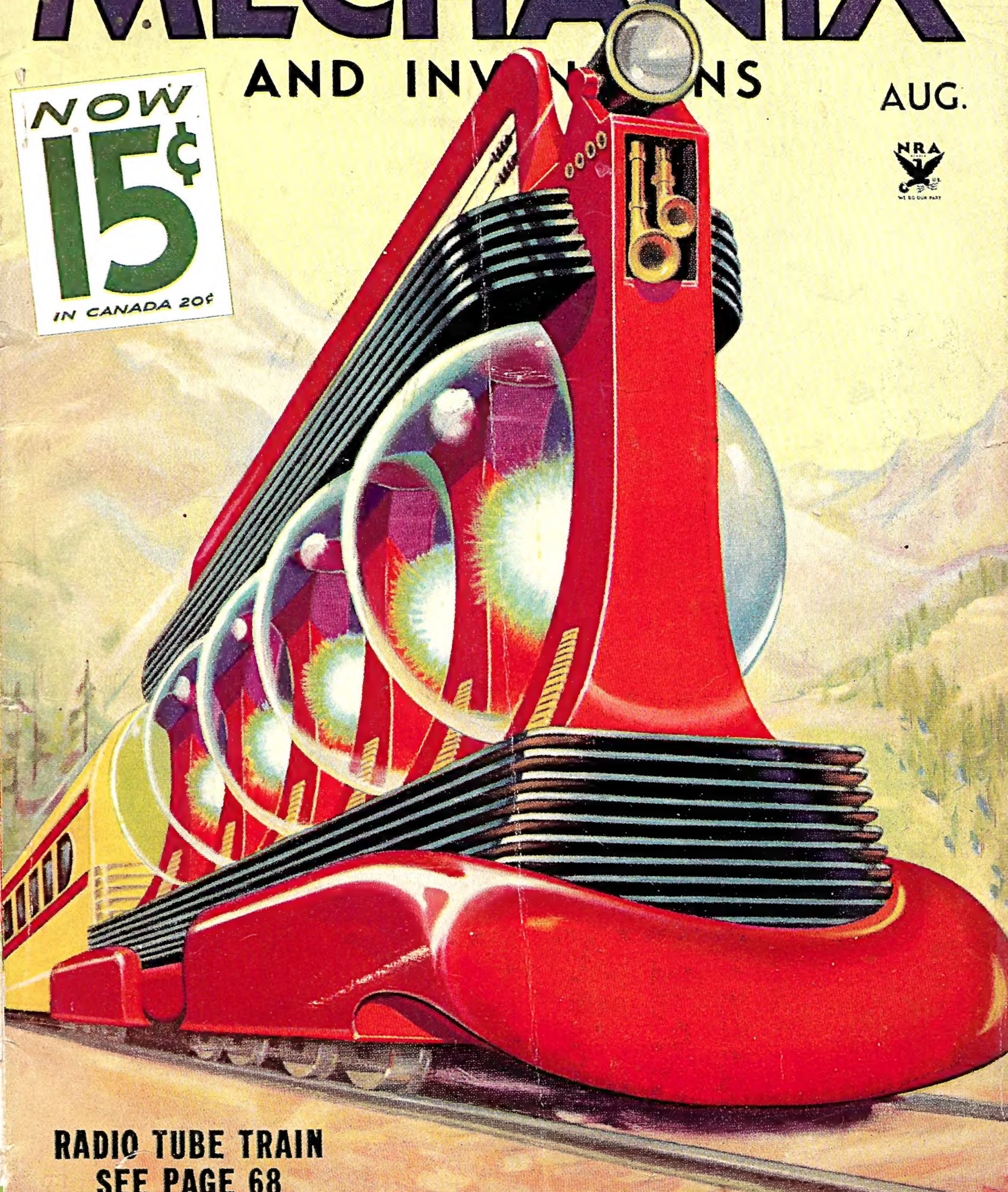

RADIO TUBE TRAIN
SEE PAGE 68

NEW LOW PRICES on

GOODRICH-Firestone GOOD YEAR U.S., FISK and OTHERS

$2.15
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YOU CAN'T BEAT OUR PRICES

And we defy anyone to excel our quality. Every standard brand tire reconstructed by our superior, modern method is positively guaranteed to give full 12 months' service under severest road conditions. This guarantee is backed by the entire financial resources of an old, reliable company. Here are today's lowest tire prices.

BALLOON TIRES

Size Rim	Tires	Tubes
29 x 4.40 - 21	$2.15	$0.85
29 x 4.50 - 20	2.35	.85
30 x 4.50 - 21	2.40	.85
28 x 4.75 - 19	2.45	.95
29 x 4.75 - 20	2.50	.95
29 x 5.00 - 19	2.85	1.05
30 x 5.00 - 20	2.85	1.05
28 x 5.25 - 18	2.90	1.15
29 x 5.25 - 19	2.95	1.15
30 x 5.25 - 20	2.95	1.15
31 x 5.25 - 21	3.25	1.15
28 x 5.50 - 18	3.35	1.15
29 x 5.50 - 19	3.35	1.15
30 x 6.00 - 18	3.40	1.15
31 x 6.00 - 19	3.40	1.15
32 x 6.00 - 20	3.45	1.25
33 x 6.00 - 21	3.65	1.25
32 x 6 50 - 20	3.75	1.35

TRUCK BALLOONS

Size	Tires	Tubes
6.00-20	$ 3.75	$1.65
7.00-20	5.95	2.95
7.50-20	6 95	3.75
8.25-20	11.45	4.95

Regular Cord Tires

Size	Tires	Tubes
30 x 3½	2.35	.75
31 x 4	2.95	.85
32 x 4	2.95	.85
33 x 4	2.95	.85
34 x 4	3.25	.85
32 x 4½	3.35	1.15
33 x 4½	3.45	1.15
34 x 4½	3.45	1.15
30 x 5	3.65	1.35
33 x 5	3.75	1.45
35 x 5	3.95	1.55

Heavy Duty Truck Tires

Size	Tires	Tubes
32x6	$ 7.95	$2.75
34x7	10.95	3.95
36x6	9.95	3.95
36x8	12.45	4.25
40x8	15.95	4.95

All Other Truck Sizes

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ALL TUBES ARE GUARANTEED BRAND NEW

Send Only $1 Deposit on each tire. (On each Truck Tire send a $4 deposit.) We ship balance C. O. D. **5 per cent** discount for full cash with order. *Any tire failing to give 12 months' service replaced at half price.*

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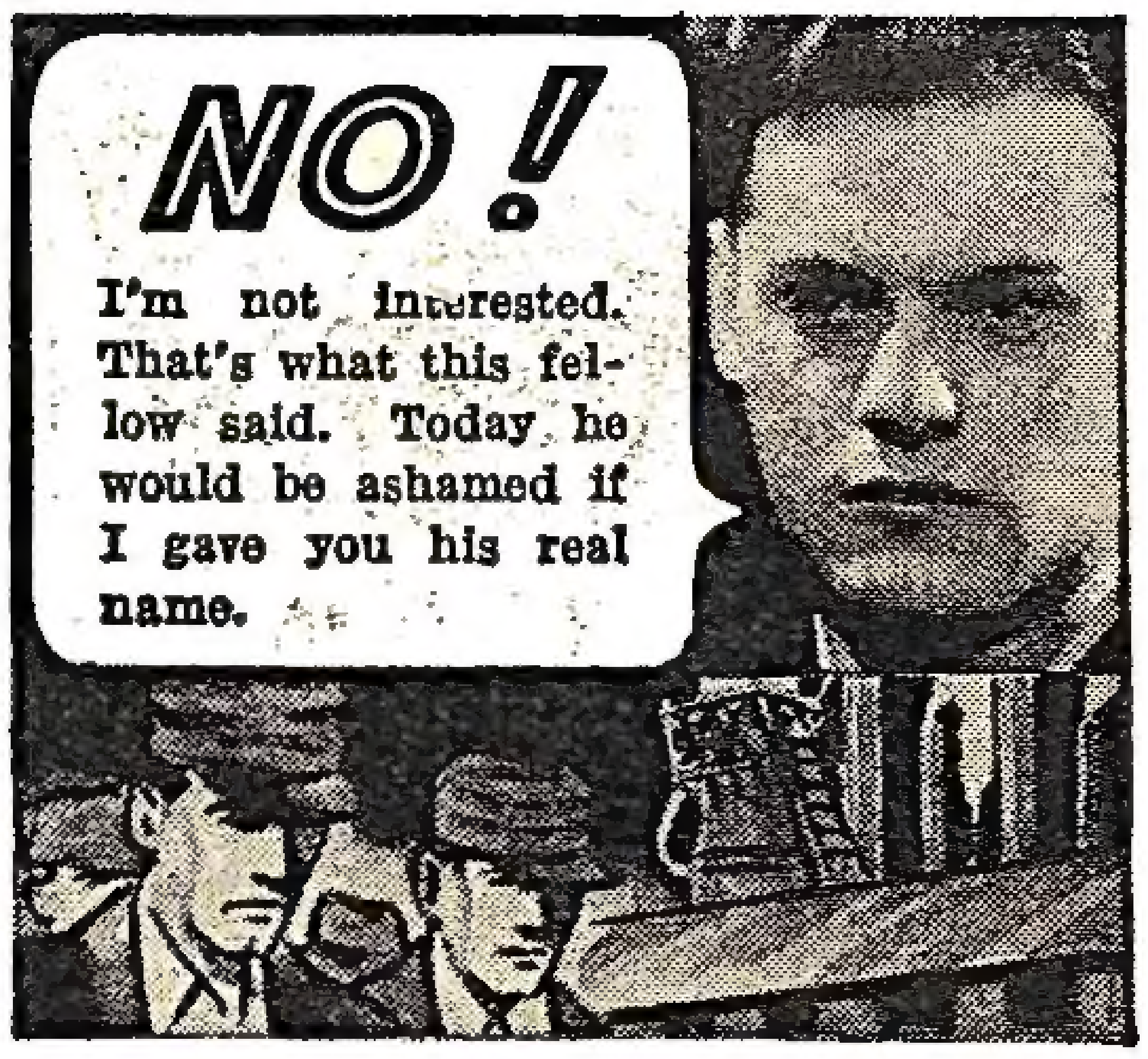
FREE BRAND NEW TUBE or "RAY-O-VAC" LANTERN with each ORDER FOR 2 TIRES

Read what happened to these two men when I said:

YES!
I'll take your training. That's what S. J. Ebert said. He has made good money and found success.


NO!
I'm not interested. That's what this fellow said. Today he would be ashamed if I gave you his real name.

I will Train You at Home in Spare Time for a GOOD JOB IN RADIO

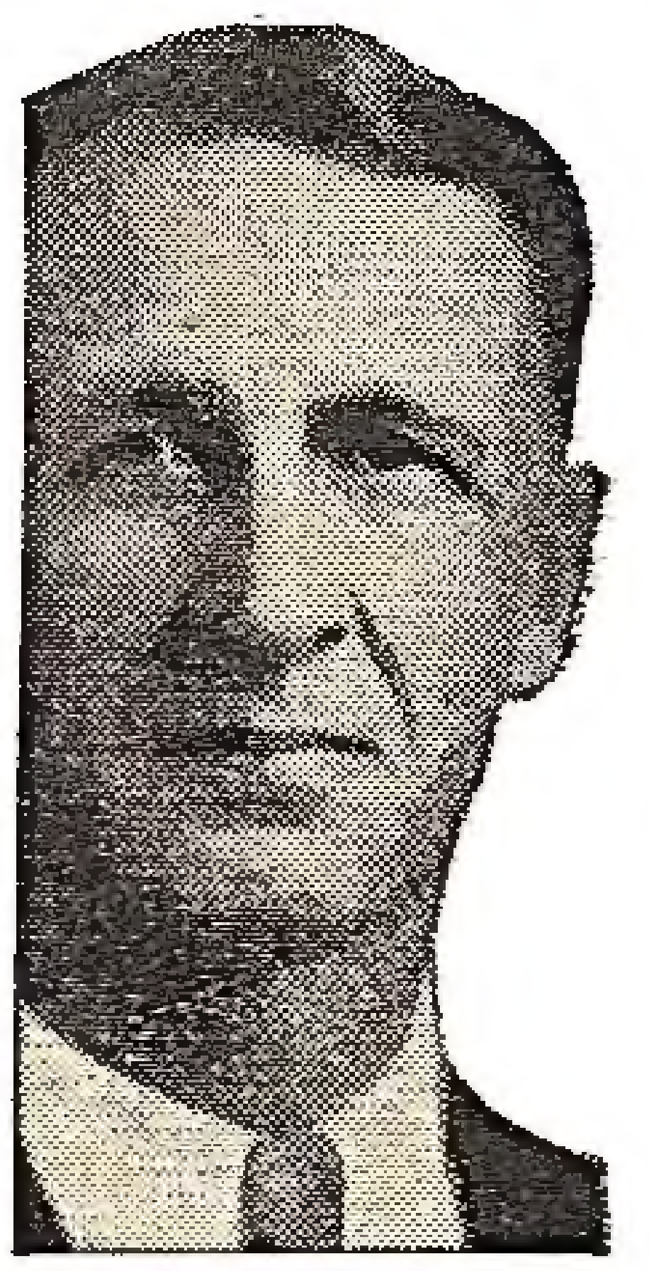
These two fellows had the same chance. Not long ago they each clipped and sent me a coupon, like the one in this ad. They got my book on Radio's opportunities.

S. J. Ebert, 49-B Quadrangle, University of Iowa, Iowa City, Iowa, saw that Radio offered him a real chance. He enrolled. The other fellow, whom we will call John Doe, wrote that he wasn't interested. One of those fellows who wants a better job, better pay, but never does anything about it. One of the many who spend their lives in a low-pay, no-future job, because they haven't the ambition, the determination, the action it takes to succeed.

Read what S. J. Ebert wrote me and remember that John Doe had the same chance: "Upon graduation I accepted a job as serviceman, and within three weeks was made Service Manager. This job paid me $40 to $50 a week compared with $18 I earned in a shoe factory before. Eight months later I went with Station KWCR as operator. From there I went to KTNT. Now I am Radio Engineer with WSUI. I certainly recommend the N.R.I. to all interested in the greatest field of all, Radio."

Get ready for Jobs like these. Many Radio Experts make $40, $60, $75 a week

Spare time and full time set servicing; installing, operating, maintaining broadcast, aviation, commercial, police, ship and television stations. Good jobs with Radio dealers and jobbers. A service shop or Radio retail business of your own. I'll train you for these and other good jobs in connection with the manufacture, sale and service of Radio sending and receiving sets, auto sets, loud speaker systems, short wave sets, etc.



"I want to help you. If you are earning less than $35 a week I believe I can raise your pay. However, I will let you decide that. Let me show you what I have done for others, what I am prepared to do for you. Get my book, read it over, and decide one way or another." *J. E. Smith.*

Save Money—Learn at Home. Money Back Agreement Protects You

Hold your job. I'll train you quickly and inexpensively right at home in your spare time to be a Radio Expert. You don't need a high school or college education. My 50-50 method of training—half with lessons, half with Radio equipment—gives you broad practical experience—makes learning at home easy, fascinating, practical. I will agree in writing to refund your money if you are not satisfied with my Lesson and Instruction Service when you finish.

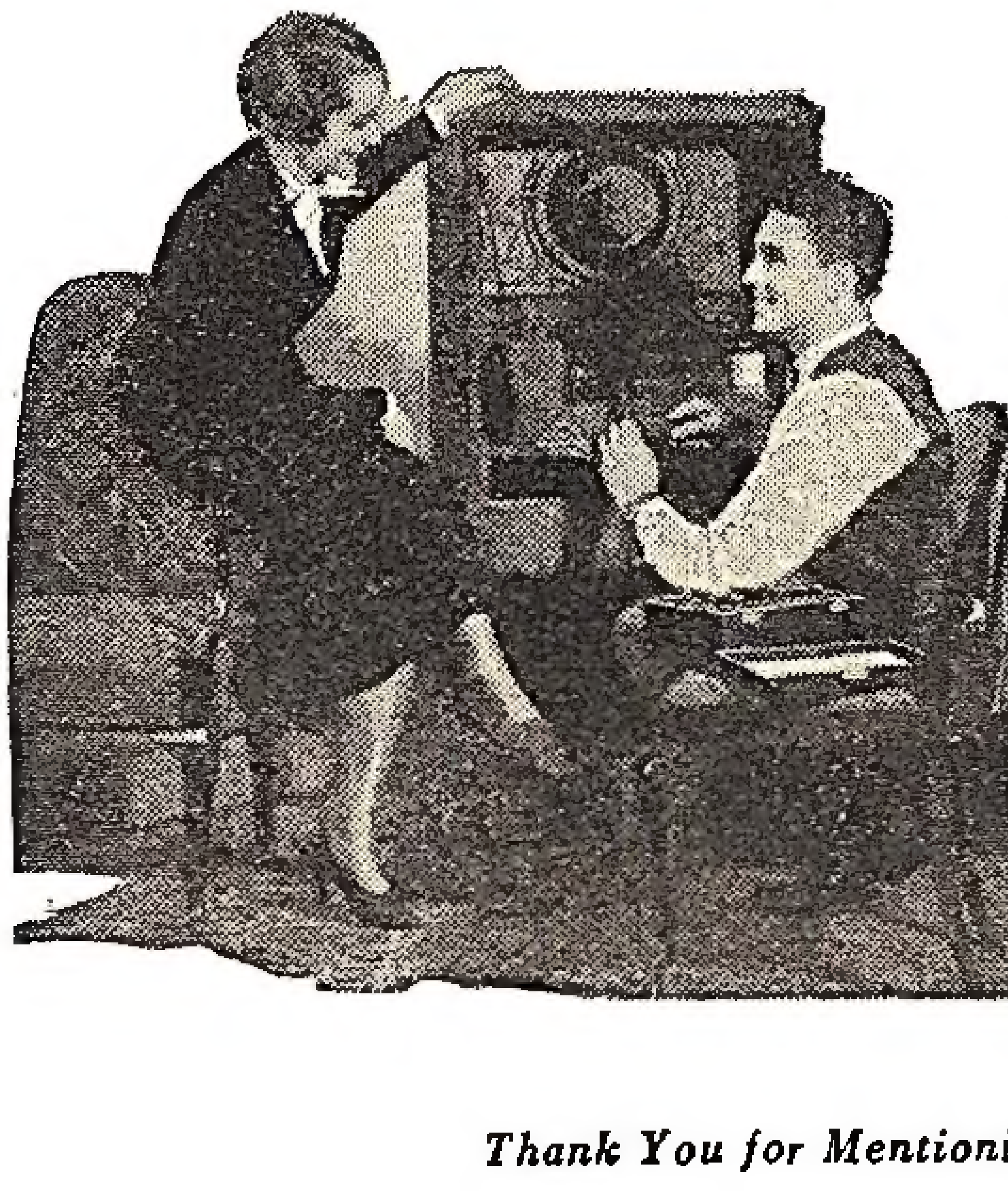
Earn $5, $10, $15 a Week in Spare Time

That's what many of my students do soon after enrolling. I'll give you special training, plans and ideas to help you do it. Many students have made $200 to $1,000 in spare time while learning. Nearly every neighborhood offers a spare time serviceman an opportunity to make good money. I'll show you how to "cash in"—show you why my Course is World-Famous as "the Course that pays for itself."

Find Out What Radio Offers You

Mail the coupon. My book is free to any ambitious fellow over fifteen years of age. It tells you about Radio's spare time and full time job opportunities—about my Course, what I give you, what my students and graduates do and make. There is no obligation. Act today. Mail coupon in an envelope or paste on a 1c postal card. Do it right now.

J. E. SMITH, President
National Radio Institute, Dept. 4HH
Washington, D. C.



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Rich Rewards in Radio

FOR FREE BOOK OF FACTS ABOUT RADIO

J. E. SMITH, President, National Radio Institute,
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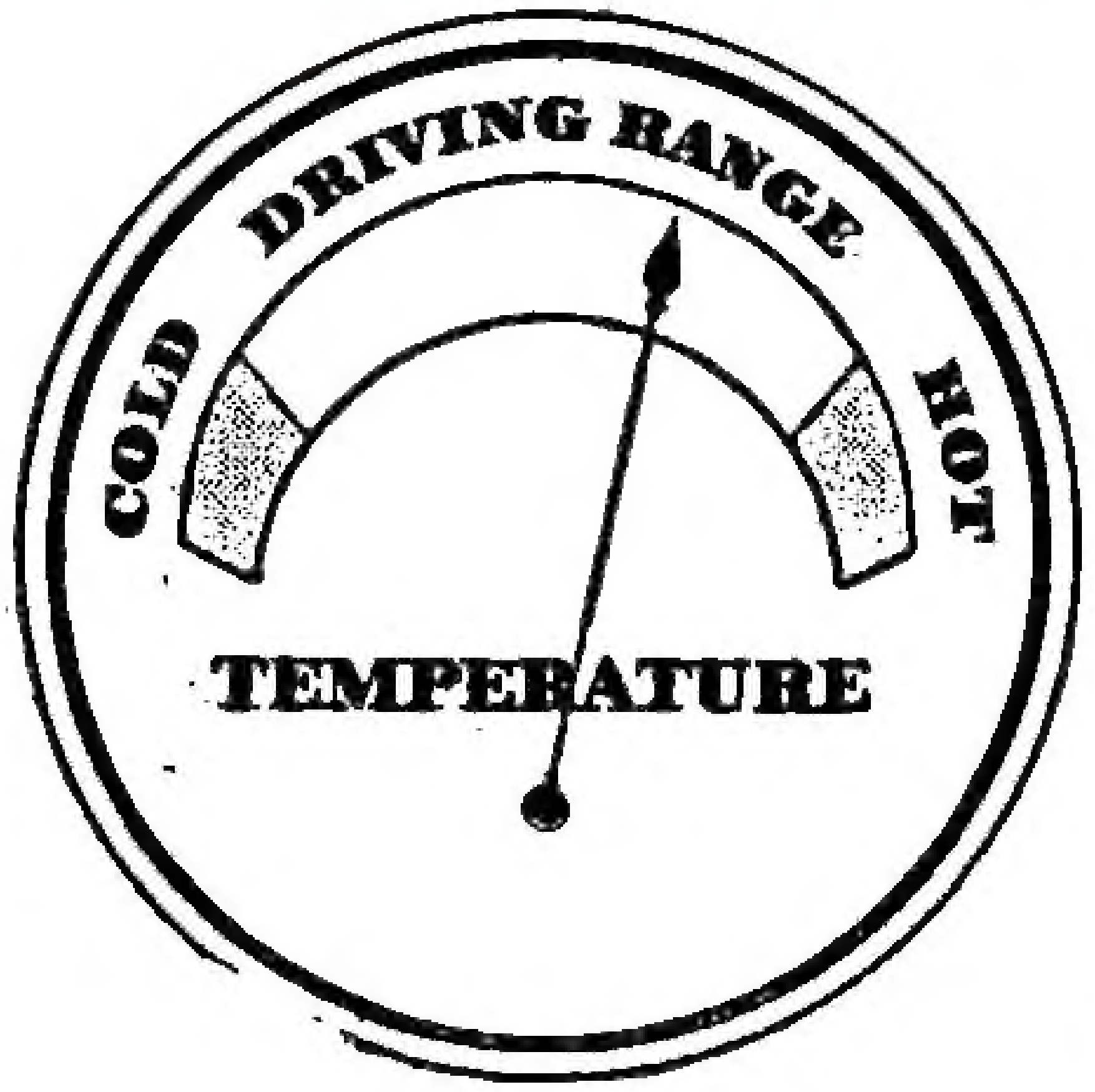
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HOT
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The Ethyl fluid in Ethyl Gasoline maintains the right balance. By preventing harmful knock, it keeps your motor running coolly and sweetly on the most sweltering days. That in turn protects your oil, keeps the temperature lower *inside* your car and prevents the serious and costly damage that overheating so frequently causes. Next time get Ethyl! Ethyl Gasoline Corporation, N. Y. C.

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AUGUST
1934

MODERN MECHANIX AND INVENTIONS

Volume XII
Number 4

CONTENTS

SPECIAL FEATURES

Exclusive! My Flight Into the Stratosphere - - - - - - - 34
By Jean Piccard

Boat Building Club Gets Charter in Society of Mechanix and Inventors - 39

How a Fireworks Magician Tames Dynamite - - - - - - - 40
By Paul Paddock

Riding Motor Broncos to Victory - - 45
By Joe Petrali,
National Hillclimbing Champion

New Chicago Stockyards to be Fireproof 49

Problems of Staging Championship Fight 50
By Alfred Albelli

Powderless Gun Hurls Shells 100 Miles 53

Radio Hunters Seek Pirate Gold - - 54
By Leonard Walters

Are You Fit to Drive an Automobile? - 58
By John C. Harper

Microscope Opens New Worlds to Hobbyists - - - - - - - - 61
By Julian D. Corrington, Ph.D.

Will "Black Blizzards" Make U. S. a Desert? - - - - - - - - 64
By James Nevin Miller

Ships Are Launched With Sand - - 70
By Nic Sprank in Oddities of Science

How Carnival Racketeers Fleece the Public - - - - - - - - 72
By Earl Chapin

New Speed Era Dawns by Harnessing Diesel Power - - - - - - - 80
By Robert Faherty

Fight Fire Forty Years to Work Burning Mine - - - - - - - - - 85

Sportsmen's Campfire - - - - - 86
By Robert Page Lincoln,
Hunting and Fishing Editor

SHORTER FEATURES

Solving Readers' Problems - 12
Track Barrier Leads Auto Devices - - - - - 56
Byrd's Ice Tunnel Village - 63
"Life in Ice" Prize Contest - 66
Radio Tube Train - - - 68
Needed Inventions - - - 75
Repairing Sunken Highways - 78
Landing Game Fish With Tempting Lures - - - 86
Camp Kinks Simplify Tasks - 88
Fishing Handikinks - - 89
Animated Lawn Gadgets - - 96
Keeping Rooms Cool - - 97
Find Gold With Black Light Box - - - - - - - 101
Travel Light on Week-end Bike Cruises - - - - 108
Wyoming Top Luggage Carrier - - - - - - 112
Swimmin' Hole Teeter-Totter 113
With the Collectors - - - 114
June Contest Winners - - 142
New Business Inventions - 146

HOW-TO-BUILD FEATURES

Scooter Steers With Airplane Joystick - - - - - - 90
By Weston Farmer

Real Flying Thrills With a Captive Plane - - - 98
By Douglas Rolfe

Mount a Sail on Your Bike - 103
By Hi Sibley

Floating Drydock Raises Boats 104
By Robert G. Silbar

Colonial Bridge Lamp - - 106
By O. E. Olson

Building Body of "Aloha," Trailer de Luxe—Part II - 110
By Robert W. York

(Contents continued on page 6)

TABLE OF CONTENTS

Continued From Page 5

NEW MECHANICAL INVENTIONS

Tiny Motors Made From Iron Pipe - - - 37
Ash Tray Man Blows Out Cigarettes - - - 37
Trailer Truck Delivers New Cars - - - 38
German Invents "Flying Bicycle" - - - 38
Radical Streamlines Feature 1935 Car - - 43
Vertical "Oars" Propel New Boat - - - 43
Portable Fan Operates by Hand - - - 43
Burner Destroys Roadside Weeds - - - 43
Braves Sea Perils in Tiny Boat - - - 44
Safety Wheels Aid Bike Novice - - - 44
Guards Adopt Rubber Life Floats - - - 48
Tap Pipe Easily With New "Tee" - - - 48
Aluminum Boat Weighs 30 Pounds - - - 48
New Bicycle Built for Two - - - - - - 48
Club-Weight Improves Golf Swing - - - 52
Electric Device Curries Horses - - - - - 52

New Inventions for Housewives

  Shoe Heels Easily Changed - - - - - 57
  Door Knob Extension - - - - - - 57
  Cooking Thermometer - - - - - - 57
Radio Range Finder for Ships - - - - 60
Milk to Be Sold in Paper Bottles - - - 62
Electricity Helps Paralyzed Patient - - - 62
New Kiddie Carrier for Mothers - - - 67
English Bike Is Built for Three - - - 67
Outboard Bike Used in Water Polo - - 68
House Is Built of Steel Hoops - - - - 69
Camera-Gun "Shoots" Pictures - - - 69
Wheel Springs Absorb Auto Bumps - - 69
Tall Men No Longer Cut Off View - - 71
Robots Guide Transport Planes - - - 71
Motor Drives New Hedge Clipper - - - 74
Lemon Slicer Cuts Ten Sections - - - 74
Skeleton Robot Shows Golf Swing - - - 74
Electric Ear Finds Car Knocks - - - - 76
Designs Streamline Train Shell - - - 77
Novel Device Electrocutes Flies - - - 79
New Tool Weeds and Edges Garden - - 79
Pencil Sharpener Is Automatic - - - 79
Electric Muffler Warms Driver - - - 82
New Device Answers Phone - - - - 83
Auto-Ship Runs on Land or Water - - 83
Guards Reduce Motorcycle Injuries - - - 84
Room Cooler Like Chandelier - - - 84

INTERESTING SCIENTIFIC ITEMS

French Airmen Span Atlantic - - - 37
Electric Bellows Keeps Man Alive - - - 38
Huge Bus Carries 150 Passengers - - - 38
Trains Insects for the Movies - - - - 44
Cadets Play Baseball on Stilts - - - - 52
Blacksmith Sets up Shop in Auto - - - 52
Diver Broadcasts Under Water - - - 60
Giant Films Make Photo Mural - - - 60
"Asbestos" Man Walks in Furnace - - - 62
Car Propels Ferry by Own Power - - - 67
Message Girds Globe in 3 Minutes - - - 67
Aerial Ferry Carries Automobiles - - - 68
German Life Saving Suits - - - - - - 71
Latest Escalators Are Streamlined - - - 74
Composer's Dream Invents Piano - - - 76
Comic Trolley Houses Birds - - - - 76
Speedboats Adopt Relay Racing - - - 77
Roller Skate Skis Used Indoors - - - 77
Robot Combines Crooning, Housework - - 79
Gadgets Create New Form of Art - - - 82
Horse's Bit Is Radio Antenna - - - - 82
Expert Tastes Soap for a Living - - - 83
Compressed Gas for Motor Fuel - - - 84

RADIO SPARKS

Good Grounds Improve DX Reception - 93
Stopping A.C. Hum with Tinfoil - - - 93
Make Wet B Batteries from Storage Battery - 94
Build a Heavy Duty Power Supply - - - 94
Sliding Rod Antenna Stops Static - - - 95
Scratch Filter for Phono Pickup - - - 95
Winding Filament Transformers - - - 95
Test Condensers with Light Bulb - - - 95

FOR THE WORKSHOP FAN

Random Chips from the Editor's Workbench - 20
Tips for the Workshop - - - - - 92
Vases from Phonograph Records - - - 97
Timely Summer Ideas - - - - - - 100
Vacationing Handikinks - - - - - 102
Hints for the Auto Owner - - - - - 105
3-Blade Hacksaw Cuts Grooves - - - 108
Cabinet Photo Printer Is Handy - - - 108
Curtain Rod for Drying Films - - - 109
Fork Smooths Tracing Paper - - - - 109
Electric Shutter Trips Camera - - - - 109
Acid-Proof Wood Trays - - - - - 109
Cellophane Drawings for Lantern Slides - - 109
Woodpecker Windmill for Lawn - - - 113
Rustic Log Lamp Ideal for Cabin - - - 113

William J. Kostka
Editor

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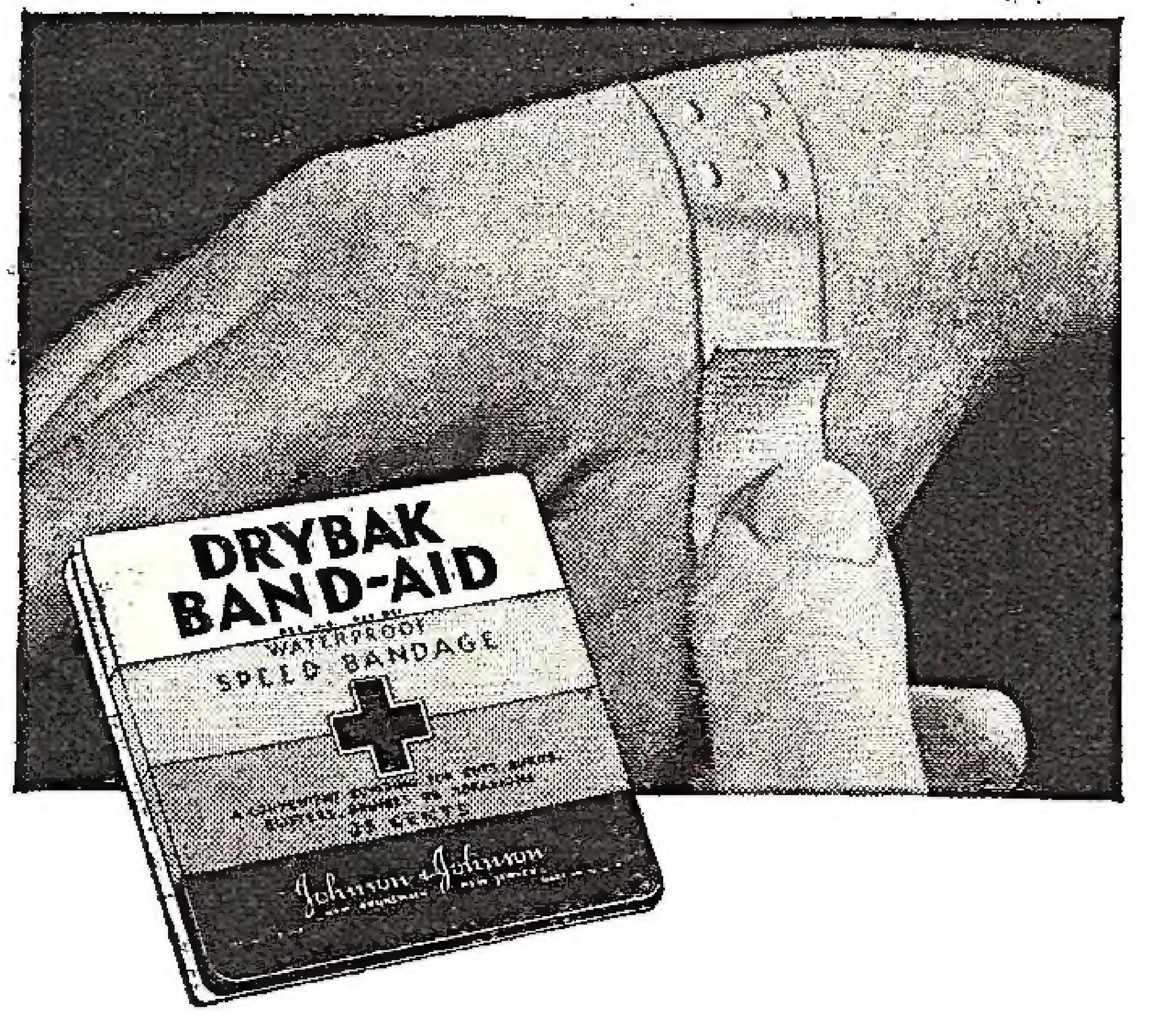

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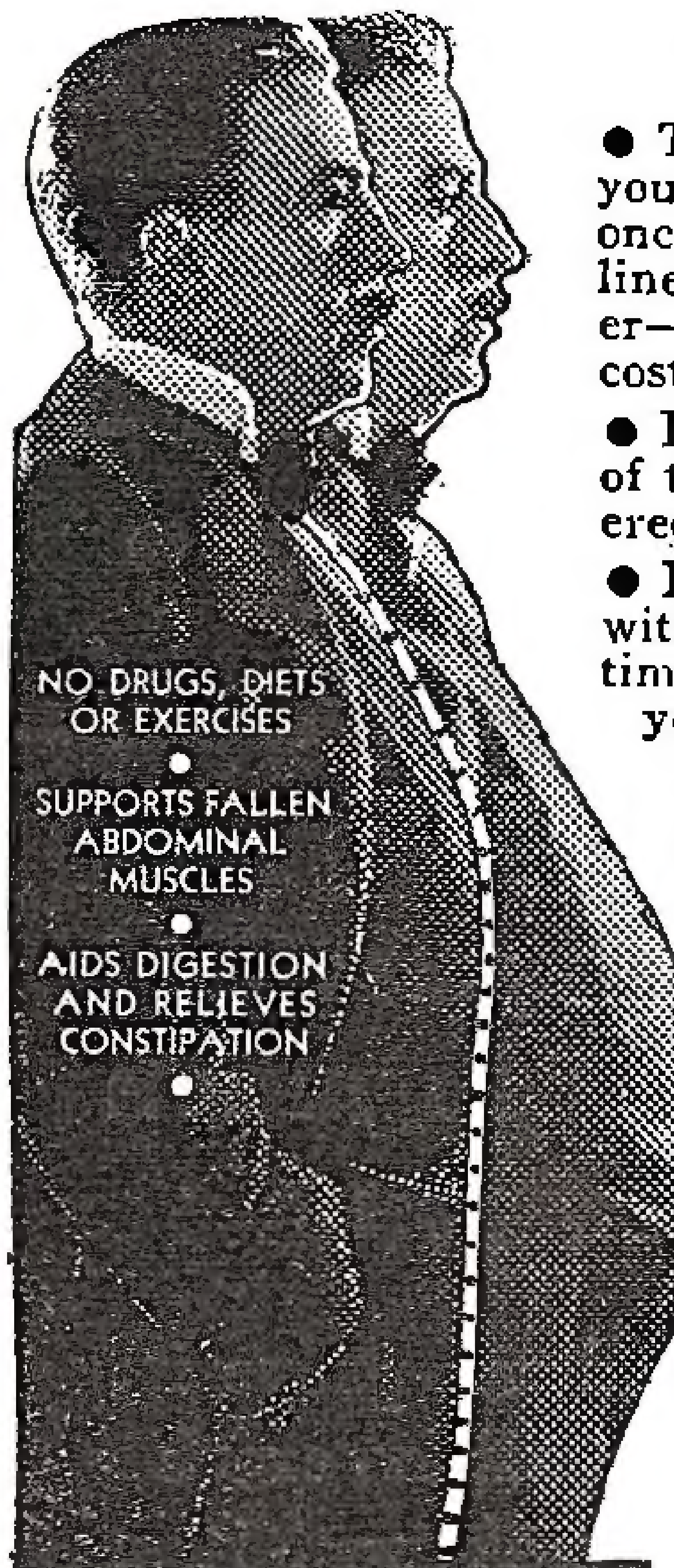
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- The Weil Reducing Belt will make you appear many inches slimmer at once, and in 10 short days your waistline will actually be 3 inches smaller—3 inches of fat gone—or it won't cost you one cent!
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- Don't be embarrassed any longer with that "corporation" for in a short time, only the admiring comments of your friends will remind you that you once had a bulging waistline.

The Massage-Like Action Does It!

- You will be completely comfortable and entirely unaware that its gentle pressure is working constantly while you walk, work or sit . . . its massage-like action gently but persistently eliminating fat with every move you make!
- Many enthusiastic wearers write that the Weil Belt not only reduces fat but it also supports the abdominal walls and keeps the digestive organs in place—that they are no longer fatigued—and that it greatly increases their endurance and vigor!

Don't Wait—Fat Is Dangerous!

- Fat is not only unbecoming, but it also endangers your health. Insurance companies know the danger of fat accumulations. The best medical authorities warn against obesity, so don't wait any longer.
- We repeat—either you take off 3 inches of fat in ten days, or it won't cost you one penny!

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And the spaces—just as easy to remember. The four spaces are always F-A-C-E. That spells "face"—simple enough to remember, isn't it? Thus whenever a note appears in the first space, it is *f*. Whenever a note appears in the second space, it is *a*.

You have learned something already! Isn't it fun? You'll just love learning music this fascinating way! No long hours of tedious practice. No dull and uninteresting scales. No "tricks" or "secrets"—no theories—you learn to play real music from real notes.

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So clear and simple are these fascinating "music lessons" that even a child can understand them. You do not lose a minute with unnecessary details—only the most essential principles are taught. Clear, concise, interesting and attractive—that is how each lesson is presented to you. And at an average cost of only a few pennies a day!

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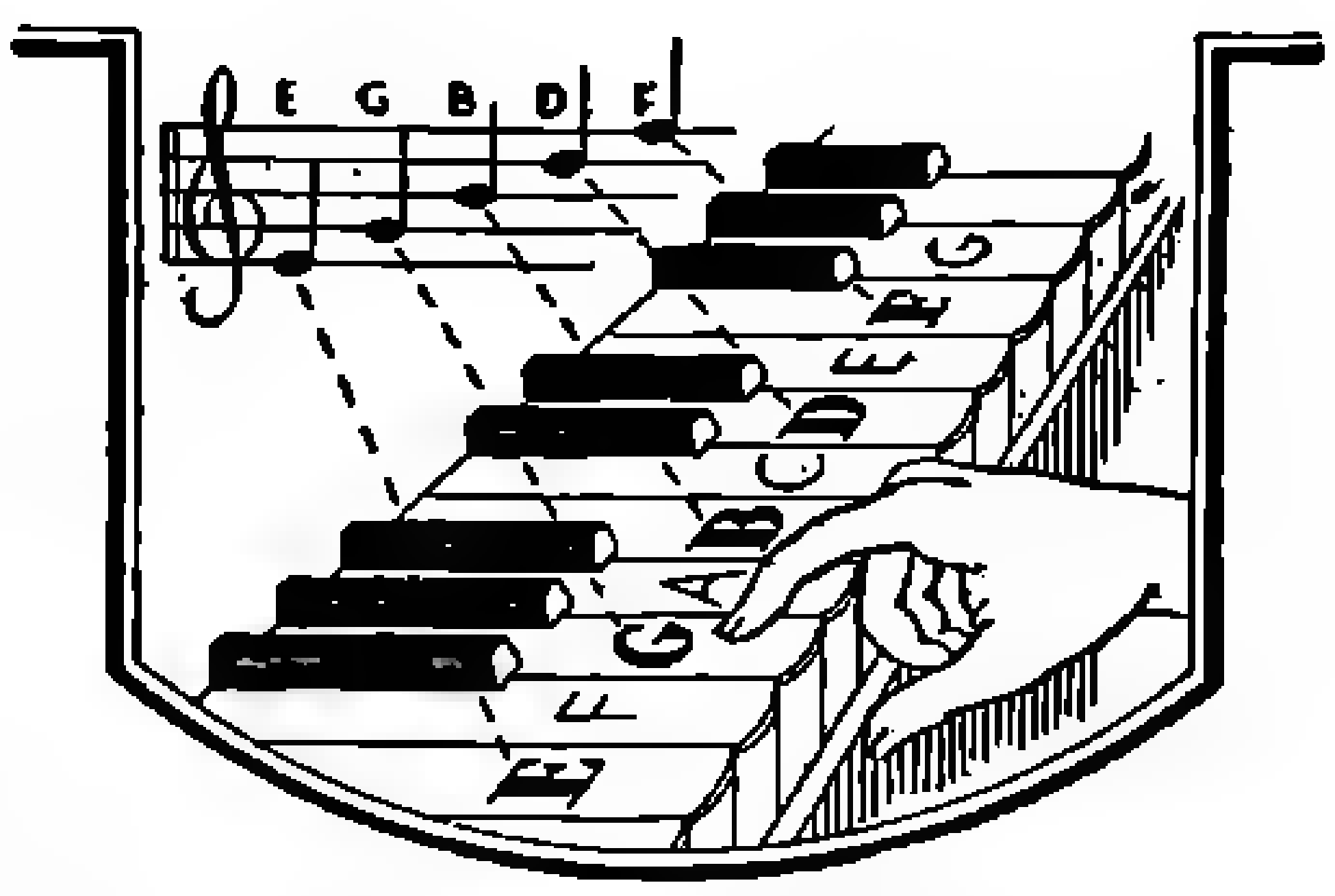

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Don't be just "another one of the guests" at the next party you go to. *Be the center of attraction!* The most popular one at a party is always the person who can entertain—and there is no finer and more enjoyable kind of entertainment than music.

Never before have you had such a chance to become a good player—quickly—without a teacher. And this method does not mean that you will be able merely to read notes and play a simple tune or two—but it means you will become a *capable and efficient player.* Many of our pupils now have positions with professional bands and orchestras.

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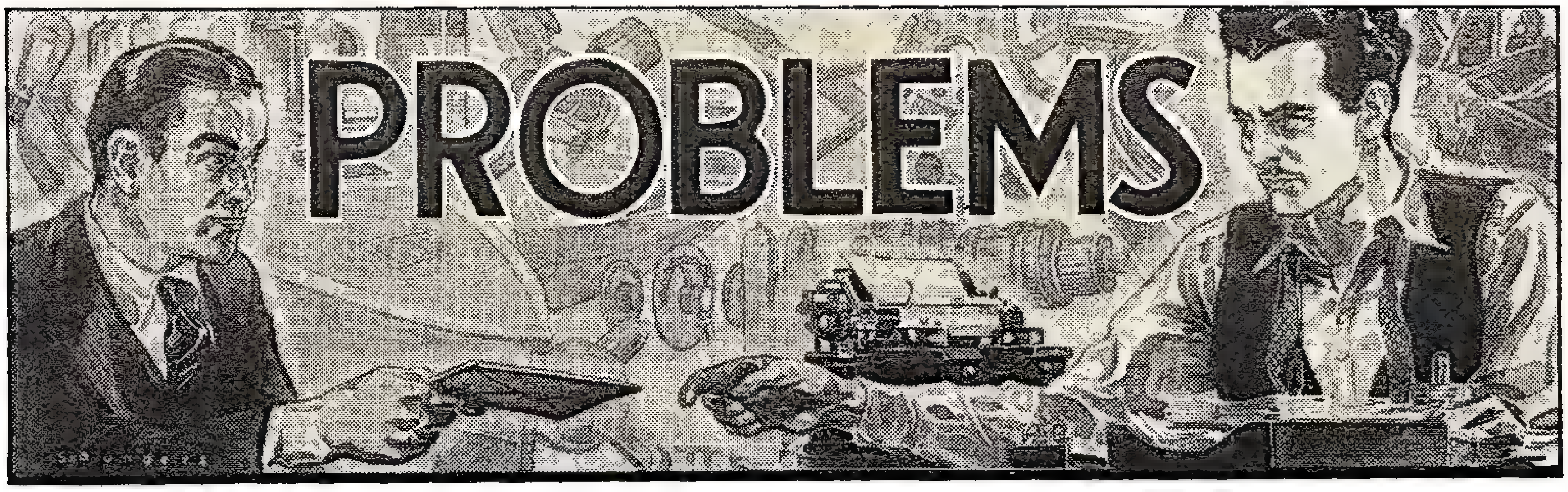


PROBLEMS

Is your own problem answered by one of these M-M reader letters?

ADDING SPEAKER TO RADIO

How can a magnetic speaker be hooked up to a radio using a dynamic speaker?—C. H. H., Milwaukee, Wisconsin.

Connect the magnetic speaker across the primary of the output transformer, rather than in series with the secondary and the voice coil. The power passing through the voice coil is not sufficient to operate a magnetic speaker.

* * *

A FUEL-LESS DIESEL ENGINE?

Here is a problem that may interest M-M readers. Suppose that, instead of injecting a fuel charge into the heated, compressed air inside a Diesel engine cylinder we inject water. This water, striking the hot air, is instantly changed into dry steam. Will the resulting pressure operate the engine?—A.M.C., Port Angeles, Wash.

Since there is no disintegration of the water in the above case, water is not the fuel. We then have an engine running without fuel—a perpetual motion machine. This has been proved impossible of achievement. Therefore, the Diesel engine will not run on water.

* * *

HOT DAYS IN ARCTIC REGIONS

Why do scientists say that on December 22 the South Polar region is the hottest part of the earth? —W. L., Wittman, Md.

On this date the South Pole is closer to the sun than any other part of the earth. It would actually be the hottest part if it were not for the huge masses of ice which absorb the heat of the sun's rays.

* * *

ADJUSTING THE "DYNAMIC DIADEM"

Referring to the "Dynamic Diadem" store window display in the April, 1934, M-M, what is the correct pitch for the various mirrors?—N. S., Billings, Mont.

With the "Dynamic Diadem" stationary, adjust each mirror until you can see at least one of the reflections of the light bulbs when standing directly in front.

CASTING LEAD IN PLASTER MOLDS

I tried to make lead castings for my model sailboat with plaster of Paris molds, but the lead boils and spatters violently as soon as it is poured in.—H. S., Long Island, N. Y.

The plaster of Paris molds must first be thoroughly dried. A medium hot oven will hasten the drying. Then give the molds several coats of shellac to stop absorption. Oil the molds or coat with powdered graphite before pouring the metal. Pewter, antimony, 50-50 solder or type lead are satisfactory for small castings.

* * *

PLANKING FOR SMALL BOATS

If I fasten the planking of my boat as close together as possible, will the boards warp when the boat is placed in the water?—J. R. S., St. Louis, Mo.

The edges of boat planking thicker than ½″ should be beveled so that planks are touching on the inside edges only. The outside cracks are then filled with regular caulking material.

* * *

A $148 AIRPLANE

Are there any airplanes being manufactured today in the United States to sell for less than $500 complete?—J. V. C., Portland, Ore.

A Texas aircraft company is now putting on the market a monoplane which sells complete with 40 h.p. motor for less than $150. Although the ship is flight tested, it is being sold as a ground training ship to eliminate stress analysis expense and avoid any legal technicalities. The cruising speed is 55 m.p.h., and the landing speed 25 m.p.h.

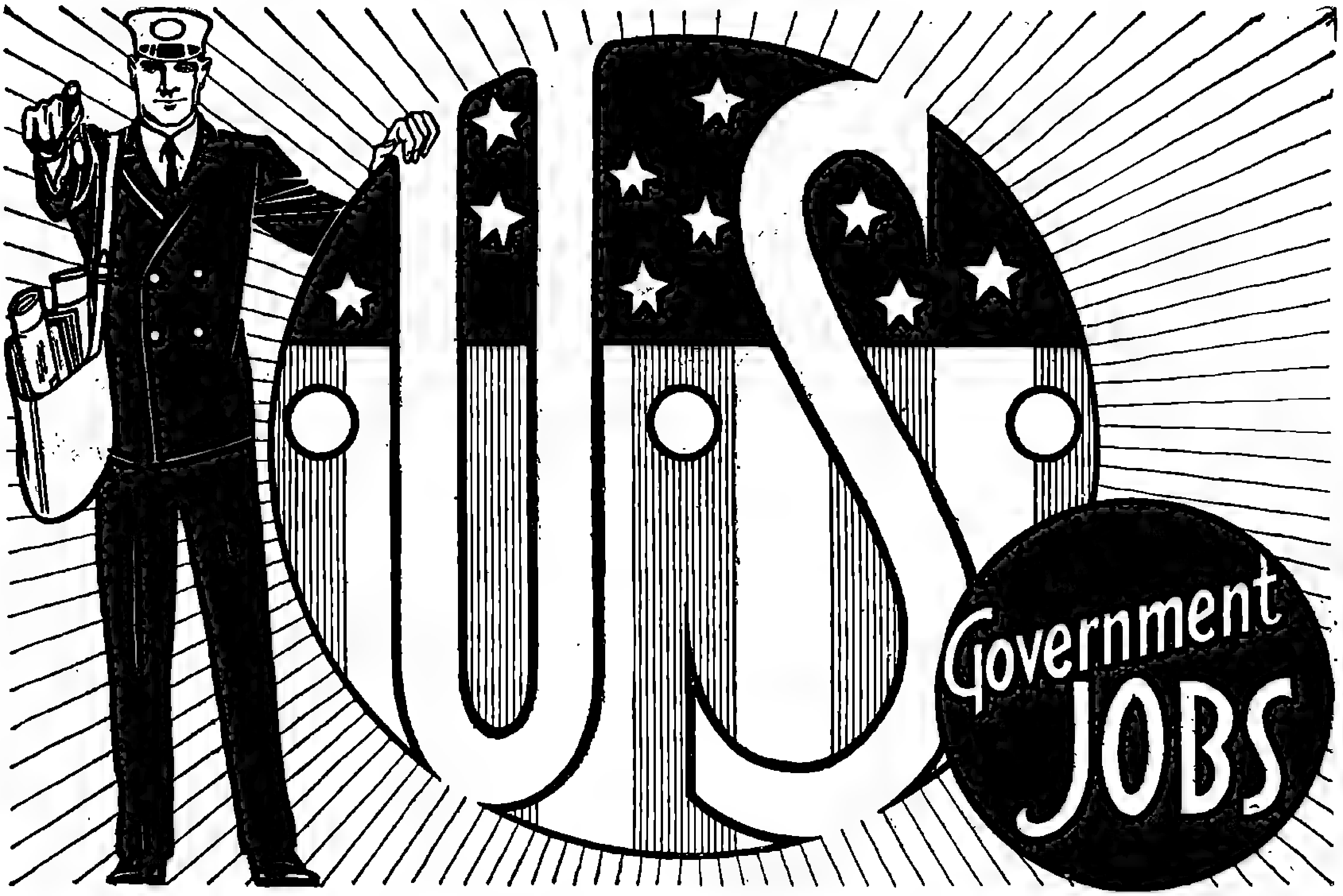
* * *

RADIO TRANSMITTER BLUEPRINTS

Have you any blueprints for a simple radio transmitter and receiver combined that can be used for code communication up to 20 miles?—H. P. J., Phillips, Wisc.

Blueprint plans for the Rabl Radio, a one tube combined transmitter and receiver, are available here at 25c postpaid.

(Editor's Note—All letters sent to this department should include a stamped addressed envelope. Write to M-M Problems Editor, 529 So. 7th St., Minneapolis, Minn.)



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Clerks and Carriers get $1700 the first year regular and in normal years automatically increase $100 a year to $2100, with further increase to $2300. They also have 15 days' vacation.

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MONEY!
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MONEY!
MONEY!

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AND OTHER MEN WITH IDEAS

SOME of the world's most successful inventions came from men who didn't consider themselves inventors at all. The telegraph was invented by a painter; the typewriter by a farmer; a poet figured out the sewing machine; a school teacher the telephone; a bank clerk the hand camera and a dentist the stock ticker. Or look at small inventions: A husband noticed his wife bending a hair pin to make it stay in her hair. That gave him the idea of the crinkly hair pin, which he proceeded to patent. One day a golfer got the idea—just a hunch—to make a wooden tee. He patented his idea—and every golfer knows that wooden tees are sold by the millions every year. These are but a few of many similar examples in inventive history.

That is why we say that the book shown on the next page is for INVENTORS and Other Men with IDEAS. Some men make a business of invention. They make their living—even fortunes—that way. Other men who are not inventors at all occasionally have good, practical inventions which could be patented to their profit and with benefit to the world.

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says about Invention

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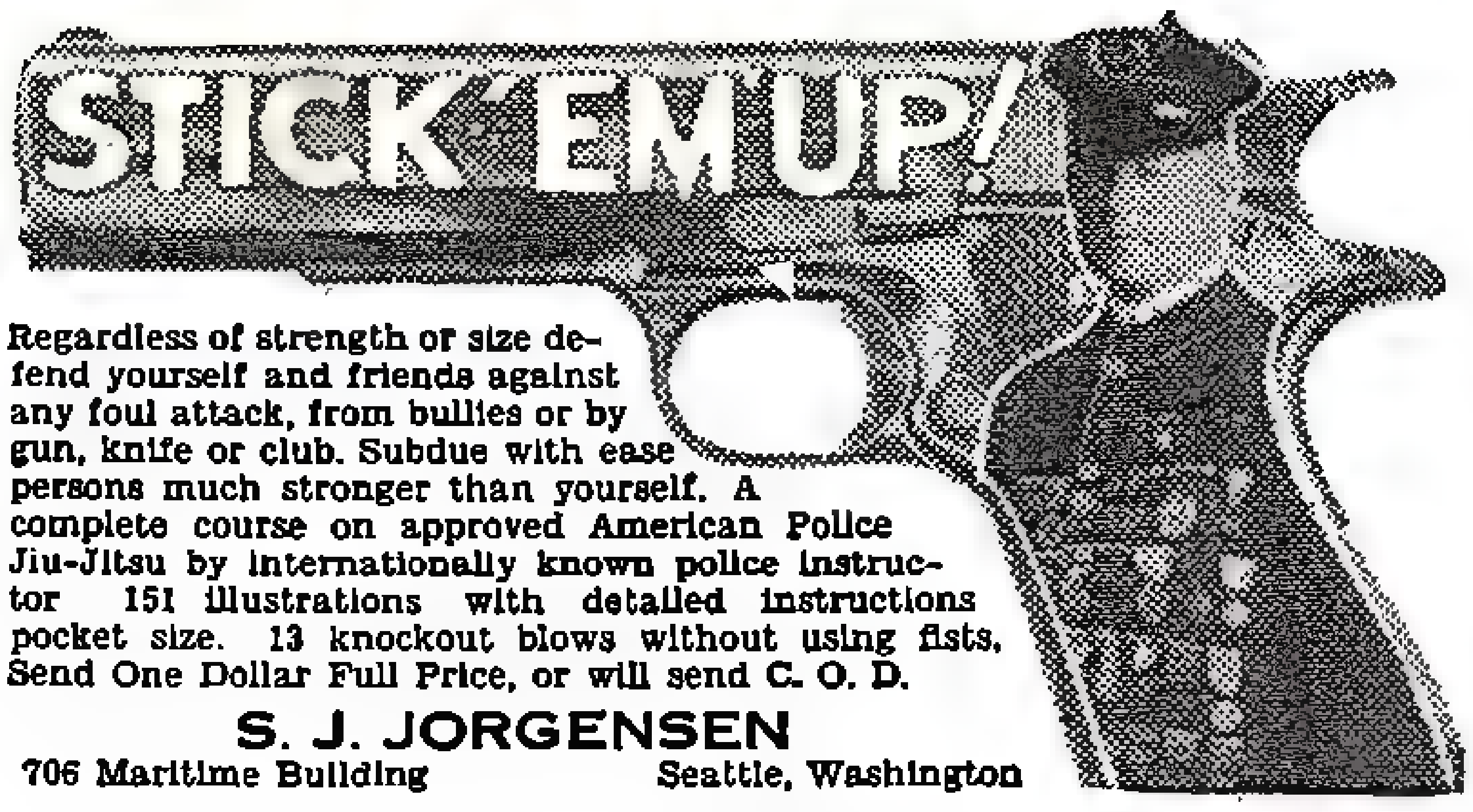
World famous soap manufacturer needs a few more men and women to take charge of fine paying soap routes. No experience or training required. Easy, dignified work that pays an immediate income up to $40 to $50 a week. Only honest sincere men and women who need money will be considered.

VICTOR SOAP CO., Route Division, Dept. MM-84, Dayton, Ohio



STICK'EM UP!

Regardless of strength or size defend yourself and friends against any foul attack, from bullies or by gun, knife or club. Subdue with ease persons much stronger than yourself. A complete course on approved American Police Jiu-Jitsu by internationally known police instructor 151 illustrations with detailed instructions pocket size. 13 knockout blows without using fists. Send One Dollar Full Price, or will send C. O. D.

S. J. JORGENSEN
706 Maritime Building Seattle, Washington

AN EASY $5. A DAY

possible with new magic invention that lights gas instantly without sparks or flame. A sure sale wherever artificial gas is used. Retails for 25c.

MYSTERY GAS LIGHTER

Get In on This Big Money Maker — ACT NOW

Packed on individual cards with instructions. Sample 10c. Rush $9 per gross or $1 per dozen.

NEW METHOD MANUFACTURING CO.
New Method Bldg., Desk MG-20 BRADFORD, PA.

BIG PAY BUSINESS
for AMBITIOUS MEN and WOMEN

98 Out of 100 FAMILIES ARE PROSPECTS

NO Experience Necessary
Investment
Competition

$5 CASH PROFIT ON EACH $6 Sale!

Here is YOUR Opportunity to get into a high grade business that should pay you a SPLENDID INCOME annually FOR LIFE! Merely introduce the Capital Mutual's sensational new **Whole Family Benefit Certificate** to every family in your community. $5 cash Profit Each Easy $6 Sale. Our certificate protects the person obtaining it and **Every** member of his family as well in the event of death! Pays individual benefits up to $1,000.00. Cost less than 3½ cents daily. No medical examination —practically no age limits. Details FREE—write NOW!

FREE SALES KIT...

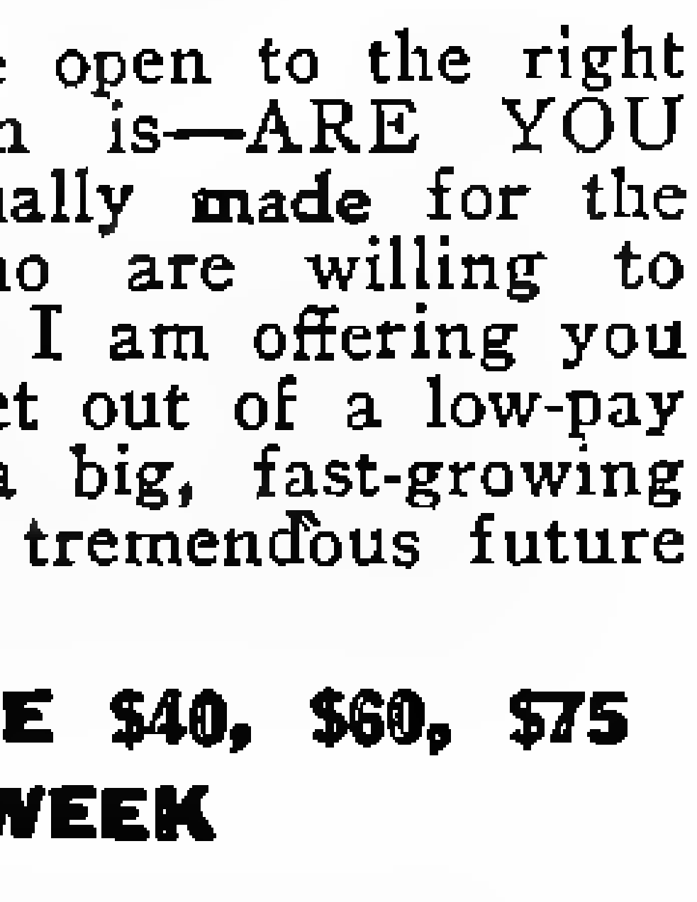
Contains everything you need to make big money. Sales tips, specimen certificate. Write for it today.

CAPITAL MUTUAL BENEFIT ASSN., Dept. 568, Denver, Colo.

EMPLOYES ONLY!

THE LUDINGTON LINES
EMPLOYES ONLY

and Yet Ambitious Men Are Getting In! The Question Is: "Are YOU Ambitious?"



WALTER HINTON

was first man to pilot a plane across the Atlantic, first to fly from North to South America, first to use a plane in exploration work. He is ready to prepare you at home in spare time for a good job in Aviation.

DON'T stand outside that gate and envy the men who are in the midst of the romance, adventure, fascination and good pay of Aviation! YOU DON'T HAVE TO. For right in your own home, in your spare time, I'll give you the training you need to get started in this fast-growing, well-paid industry. Send today for my free book. It tells all the facts.

I'LL TRAIN YOU AT HOME QUICKLY—IN SPARE TIME

What branch of Aviation appeals to you? Whether it's flying, or a job on the ground, plenty of places will be open to the right men—the **trained** men. The question is—ARE YOU AMBITIOUS? Opportunities are actually **made** for the young men who are willing to train for them. I am offering you the chance to get out of a low-pay rut and enter a big, fast-growing industry with a tremendous future —AVIATION.

Made District Traffic Agent

"When I finished your course I became connected with T.A.T., and am happy to state that promotion has come very rapidly. I shall always be grateful to you for your interest and cooperation."
—C. E. McCollum.

MANY MAKE $40, $60, $75 A WEEK

Yes, sir. Through the simple, practical method I have worked out, I can train you at home, in your spare time to fill many good-pay jobs in Aviation. There are over 40 different types of jobs to choose from in Aviation. Many of my graduates have been able to get into good ground jobs paying $40, $60, $75 a week. Others, with the additional low-cost flying instruction I arrange for, have become pilots at $300 a month or better. Send for my FREE book now and get the FACTS.

AVIATION IS GROWING FAST

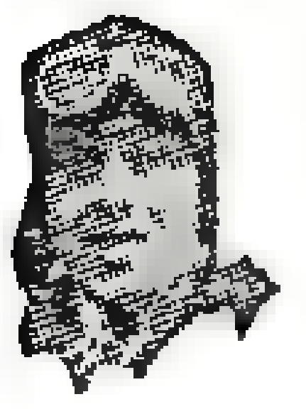
Get in on the ground floor of this amazing industry. Aviation is growing fast—and it is still a young industry. Its big development is still ahead. Start NOW to CASH IN on Aviation's big future. Get on Aviation's Payroll soon.

My Course will give you the training you need to get through that gate up there quickly. The lessons are easy to understand—hundreds of photos, charts and diagrams make everything clear. It's a practical, success-proved course. In it I've packed the knowledge gained from 16 years of practical experience and over 400,000 miles of flying.

Act Now—Get My Free Book

Send now for my FREE Book explaining everything. It tells about the opportunities in Aviation. It tells what my training will do for you. It tells about my money back agreement and free employment service. It tells what many of my graduates are doing and making. Fill in the coupon and mail it TODAY!

WALTER HINTON, Pres.
Aviation Institute of U. S. A., Inc.
1115 Connecticut Avenue
Washington, D. C.



$75 a Week as Instructor

Robt. N. Dobbins, a Hinton graduate, writes: "I cannot thank you enough for the assistance you gave me in getting my present position. Last week they promoted me to Chief Instructor, at a big salary increase."

Mail Now for Facts

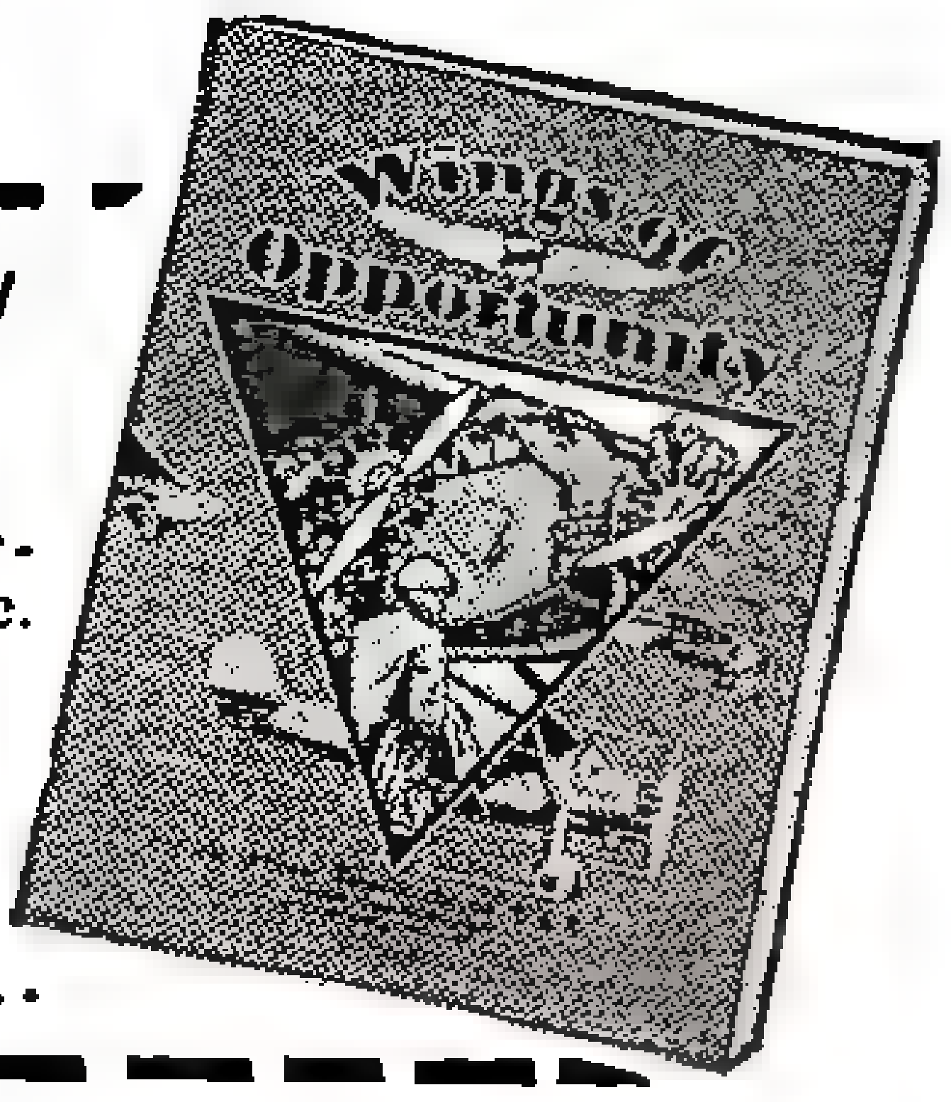
822-V

WALTER HINTON, President
Aviation Institute of U. S. A., Inc.
1115 Connecticut Ave., Washington, D. C.

Please send me a FREE copy of your book, "Wings of Opportunity." I want to know more about my opportunities in Commercial Aviation, and your tested method of home training. This request does not obligate me.

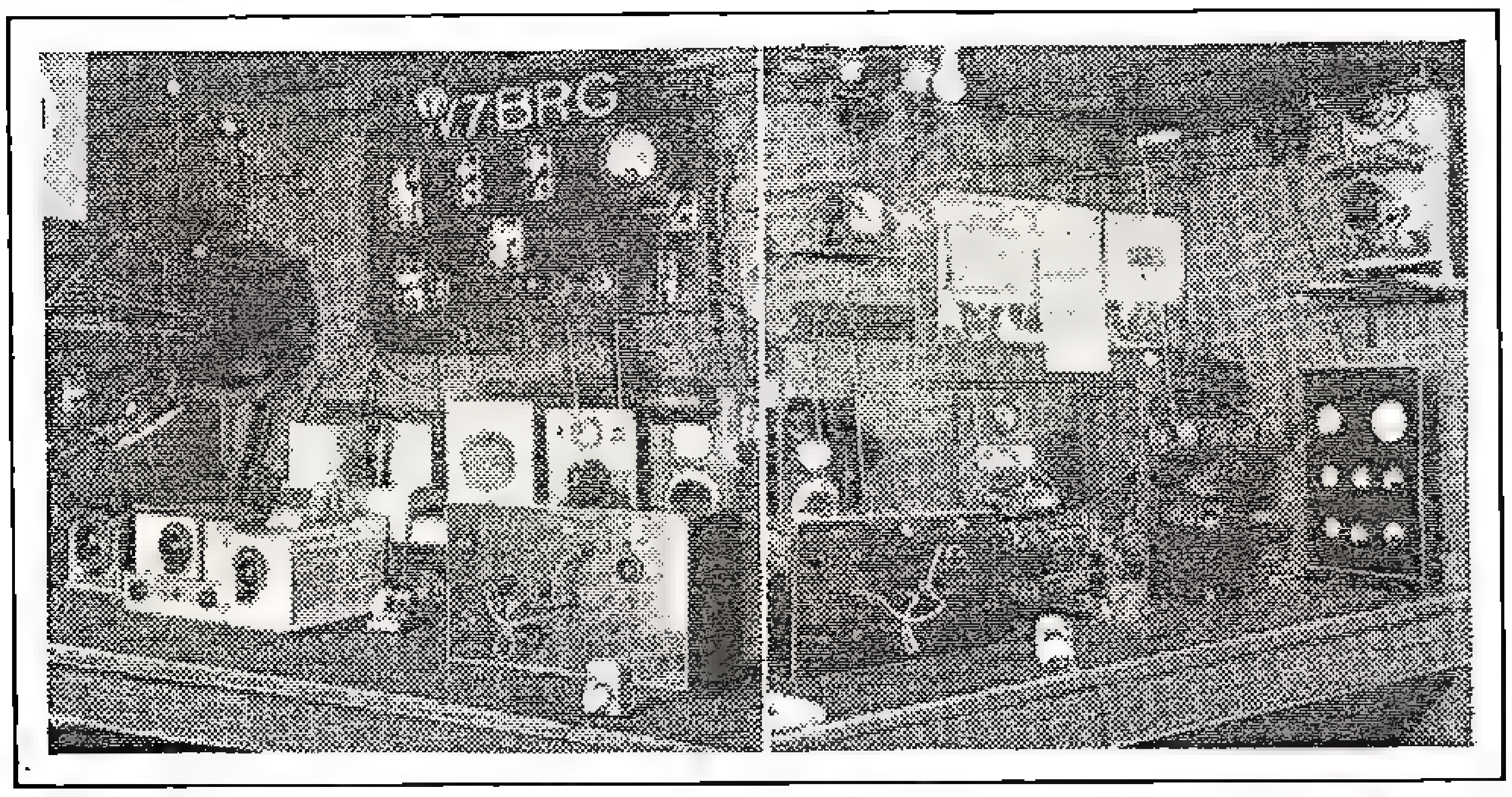
Name.. Address..
(Print clearly)

City.. State.. Age........



RANDOM CHIPS from the

Here our readers tell what they are doing. This month's stack of letters reveals boy, just 14, who flies, explores under water and speeds over ice with MM projects.



MM's Radio Sparks helped A. E. McDonell, of Spokane, Wash., build station W7BRG, shown above, and win first prize in radio photo contest. The station walls are decorated with more than 700 QSL cards.

RADIO "hams" swamped the Workbench with photos of their outfits for the radio picture contest announced in the May issue. After hours of careful selection and elimination, the judges found two which were considered the best.

First prize of $5.00 was awarded to A. E. McDonell, of Spokane, Wash. His amateur station, W7BRG, is jammed with kinks and sets from MM's Radio Sparks department. McDonell says:

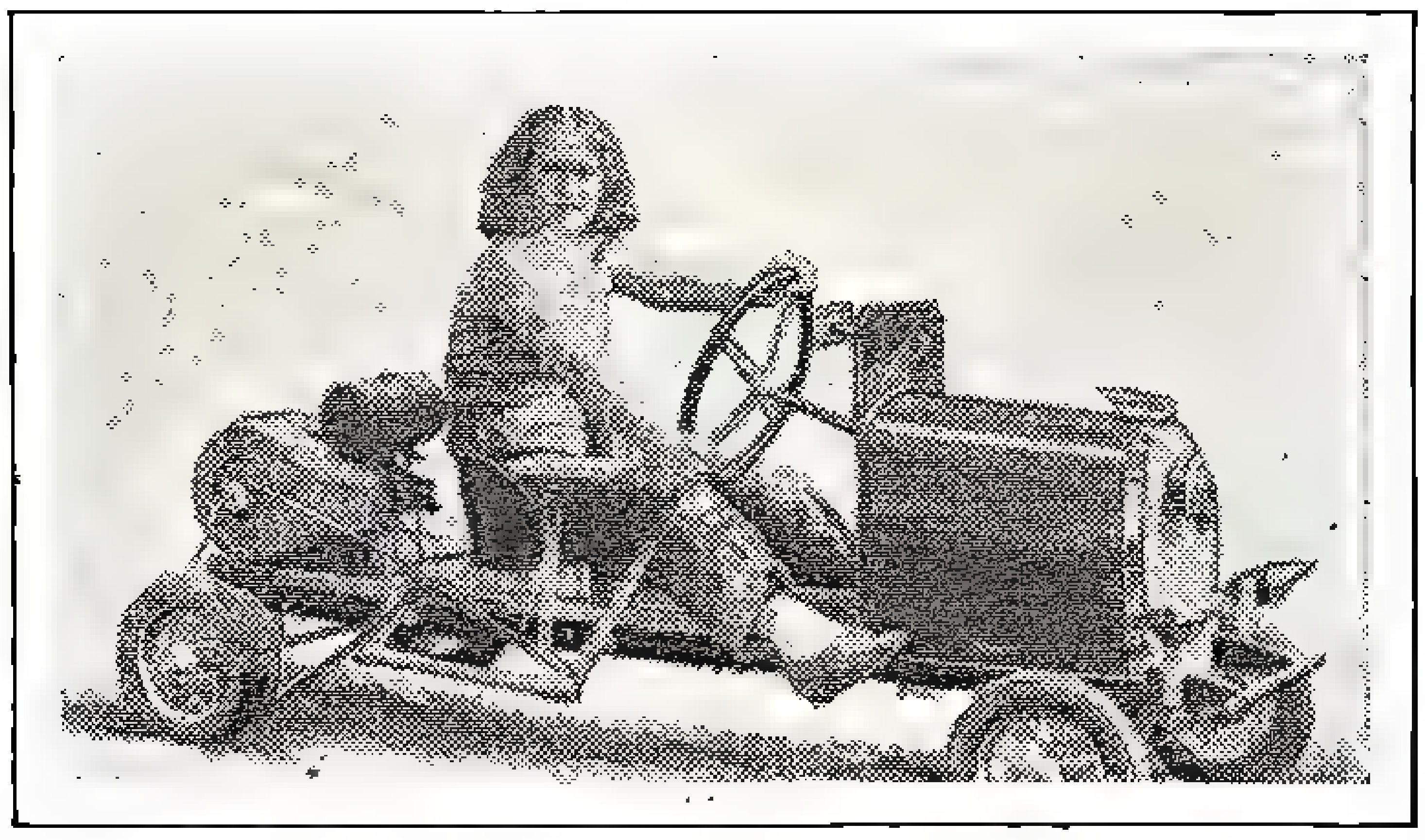
Dear Editor: Spokane, Wash.

Here's a picture of my set up. Some of the ideas I got out of your magazine. I had to take two shots to get all the station.

A. E. McDonell.

* * *

Size of outfits did not influence the decisions of judges. That is the reason second prize of $3.00 was awarded for photos of a short wave adapter. Stanley C. Mosher, of Chicago, won the prize with a police call box described in the March, 1933, issue of Modern Mechanix and Inventions. Here's part of Mosher's letter:



This midget car has a one-horse motor and will do 24 miles per. J. B. Handy offers to give MM readers details.

Chicago, Ill.

Dear Editor:

Herewith are two snapshot views of the short wave adapter that was in your March, 1933, issue.

The first station brought in was an amateur in Columbus, Ohio, without any antenna on my six-tube midget set.

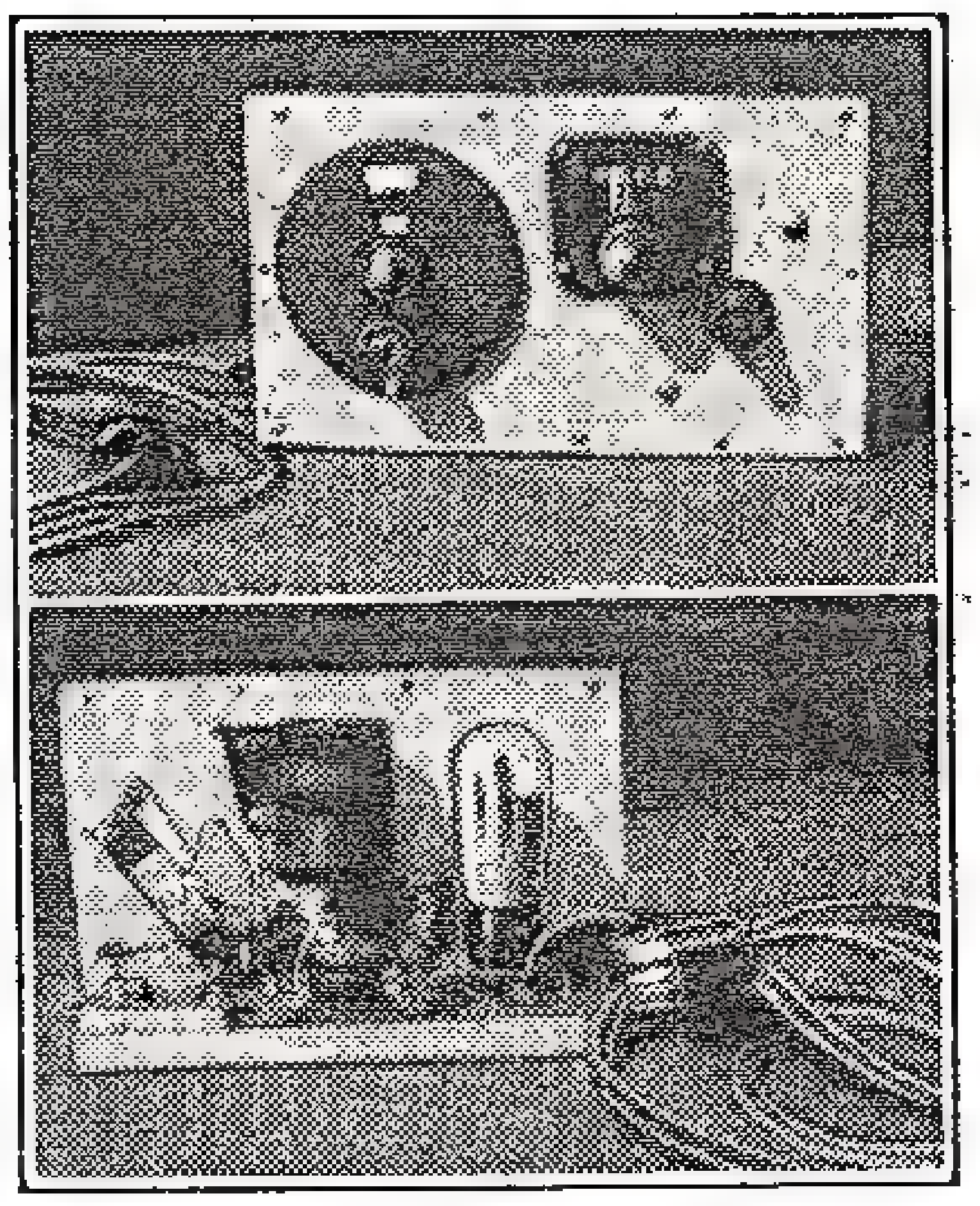
This was my first attempt at building a short wave set.

Stanley C. Mosher.

* * *

For an indefinite period the Workbench will award three prizes for the three best photos published in these columns each month. This monthly contest is open to all readers. Photographs of anything you have built are eligible.

All you have to do is snap a picture and send a print to the Workbench. Don't forget to send a brief letter along. The more interesting the letter, the better chance you will have. Each contest will close on the fifteenth of the month of the issue of the magazine. That is, the contest for this issue will close August 15. Entries received after that, however, will not be thrown out, but will be judged in the next month's contest. First prize is $5, and $3 will be awarded to the second best photo submitted, while the third prize is $2.



Stanley C. Mosher's photos of his police call box won second prize in radio photo contest.

Send all photographs to The Editor's Workbench, Modern Mechanix and Inventions, 529 S. 7th St., Minneapolis, Minn. All photographs submitted are the property of Modern Mechanix for use in these columns.

* * *

And here's a young man, just 14 years old, who flies through the air, speeds over ice, and explores under water. He knows how to use a hammer and a few other tools and found interesting things to build in MM. But let him tell the story:

Editor's WORKBENCH

$10.00 IN PRIZES EACH MONTH FOR PICTURES. Read details, then send your photo to the Workbench. Here are the Radio Contest winners.

Clearfield, Pa.

Dear Editor:

A faithful reader of MM I am and I haven't missed a flying manual since 1930. That's where I got the plans from which I built the glider. Remember that Northrop training ship? (We do. It's in the 1930 Manual.) A good landing gear and a small cut down in size are all the changes she got.

That iceboat in the picture is the one published by MM plus the usual change. This time it's the sail. She folds up for transportation.

The diving helmet is of my own design, Although I am only 14 years old I can travel on ice, under water and through the air and my next will probably be a midget car.

Walter Schaefer.

There is no doubt about Walter being a real boy. Here's hoping for more pictures from Walter and other boys like him.

* * *

Another of our readers offers to help any one wanting to build midget cars. Now is the time for the "auto babies." If you are interested, glance over this letter:

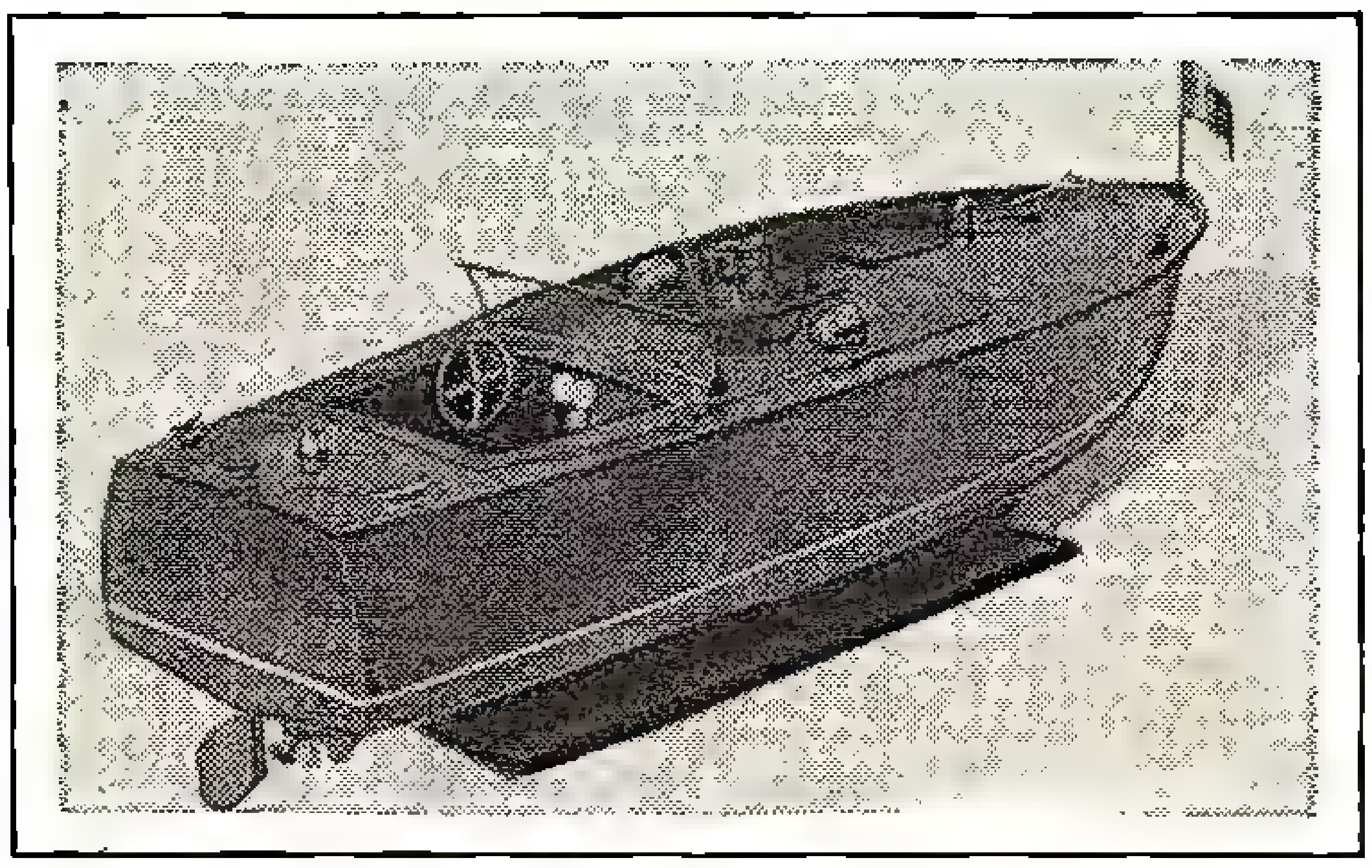
P. O. Box 737 Lynchburg, Va.

Dear Editor:

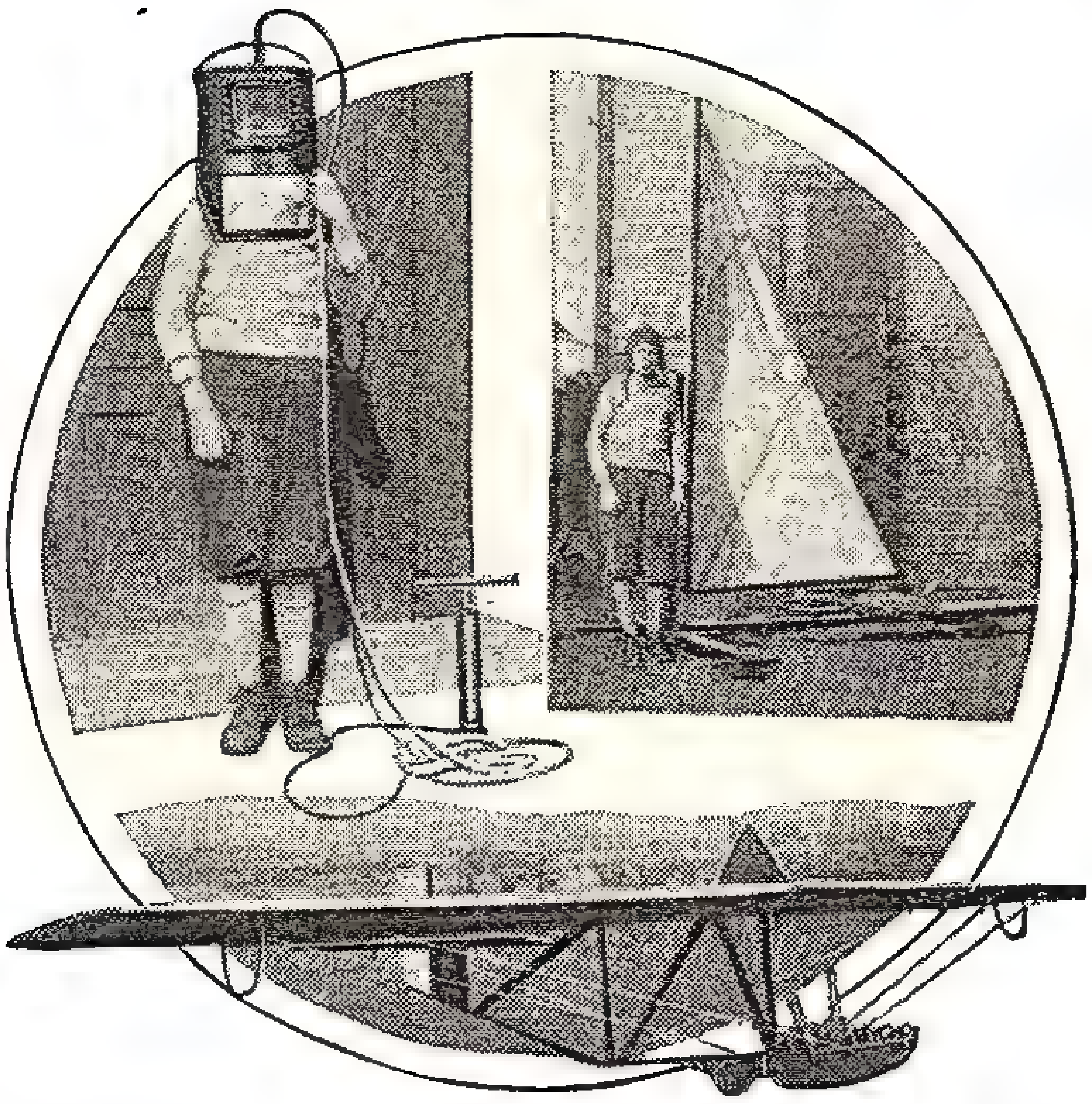
And still another midget car, although this one is big enough to be of some good. It's weight is exactly 200 pounds and it will carry more than its weight up a 15 per cent grade. 'Tis powered by a one-horse Nelson Jumbo motor; the rear axle runs on ball bearings and is mounted on rubber; the clutch should look familiar; the brake is external contracting and is actuated by the same lever. The cost was plenty. However, the speed is 24 miles per on level and 'tis strong enough for two youngsters of 120 lbs. each to go all over town in together.

I will be glad to give detail information to any one upon request. Although an industrial engineer, and so receiving at my desk dozens of magazines, yours brings the most pleasure in my spare hours.

J. B. Handy.



Here is Dean Pittenger's quarter size version of Doane's Hydrobout. He had five months of fun building the model.



Walter Schaefer (hidden under diving helmet) has had more adventures than many older men with his glider, ice boat and diving outfit. He followed MM plans to build them.

In writing to Handy, don't forget that stamped, addressed envelope for reply and that reminds us that some of you slip up on this point when sending inquiries to MM's many departments.

* * *

Dean Pittenger has found a novel use for How to Build Twenty Boats. Instead of building the full size boat, Pittinger carefully builds a scale model. This is what he says about the little boat pictured this month:

Los Angeles, Calif.

Dear Editor:

There she is. Five months of a lot of fun. A one-quarter size version of Doane's Hydrobout. She is built exactly to scale. Spruce frames, mahogany planking and put together with screws throughout.

The engine is one-cylinder, 4-cycle made by a friend of mine. It's his own design.

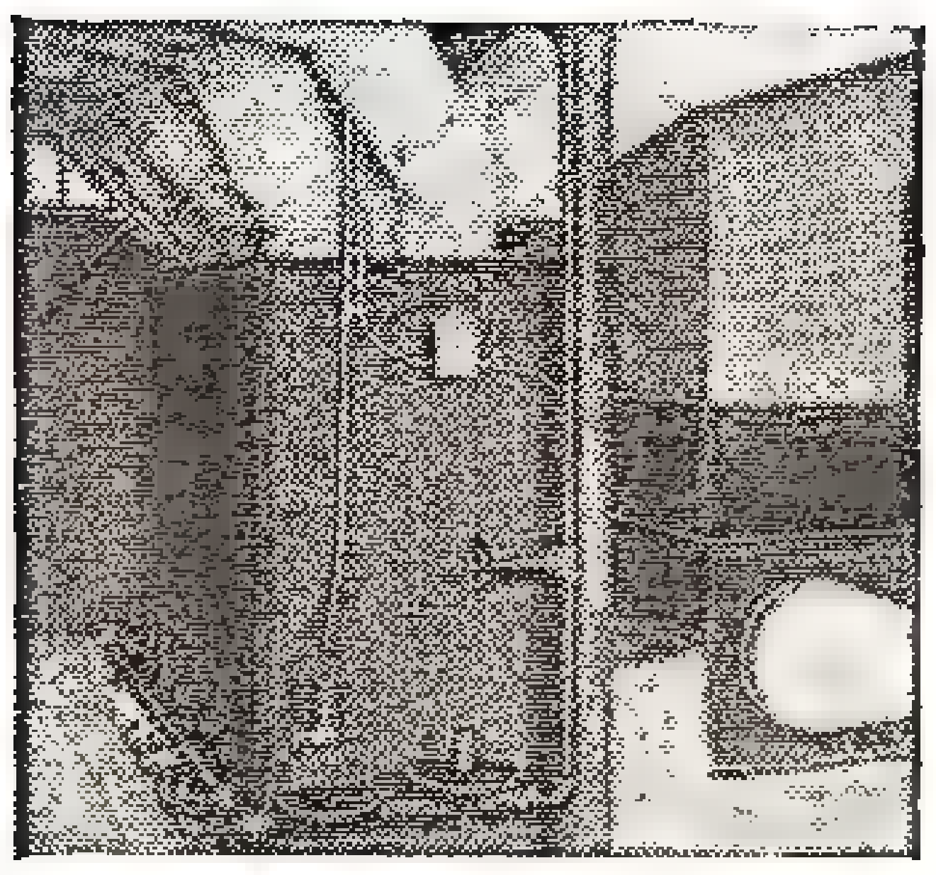
She goes about 10 to 12 miles an hour with door bell batteries fo rthe spark coil.

I will be glad to answer any questions regarding either boat or engine.

Dean Pittenger.

AIR CONDITIONING

THE NEXT BIG INDUSTRY

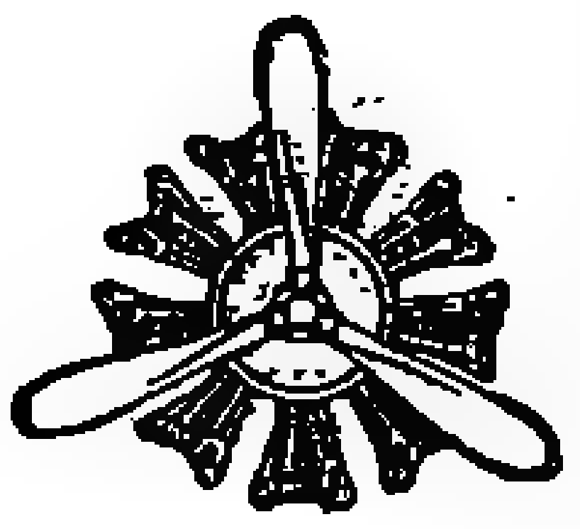


Its opportunities are as big in winter as in summer. Plumbing and heating engineers must know Air Conditioning—the field in its broader aspects invites ambitious men. Write for information on the new, up-to-the-minute course on Air Conditioning now offered by the International Correspondence Schools

. . . INVENTION—a field of opportunity for men with ideas

If you have an inventive turn of mind, this new International Correspondence Schools Course in inventing and patenting will teach you all the basic knowledge you must have in order to earn real money from your talents. The coupon will bring full information.

AVIATION ENGINEERS are leaders in modern progress



Aviation depends upon engines, and expert knowledge of aviation engines is a long step toward success in this rapidly growing industry. Many leading aviation engineers today took their first step by mailing a coupon to the I. C. S. at Scranton. Why don't you follow their example?

RADIO holds great rewards for trained men

Almost in a decade radio has become a giant industry. The opportunities created will be enjoyed by trained men. The International Correspondence Schools Radio Course, prepared by leading authorities and constantly revised, will help make you a trained man! A fascinating book—FREE.

INTERNATIONAL CORRESPONDENCE SCHOOLS

Box 2318-Y, Scranton, Penna.

Without obligation, send me full information on subject checked below:

☐ Air Conditioning
☐ Inventing and Patenting
☐ Aviation Engines
☐ Radio

☐ Architecture
☐ Concrete Construction
☐ Mechanical Engineering
☐ Reading Shop Blueprints
☐ Civil Engineering
☐ Electrical Engineering
☐ Diesel Engines
☐ Gas Engine Operating
☐ Refrigeration
☐ Chemistry
☐ Highway Engineering
☐ Poultry Farming
☐ Drafting
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☐ Good English
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☐ Show Card Lettering
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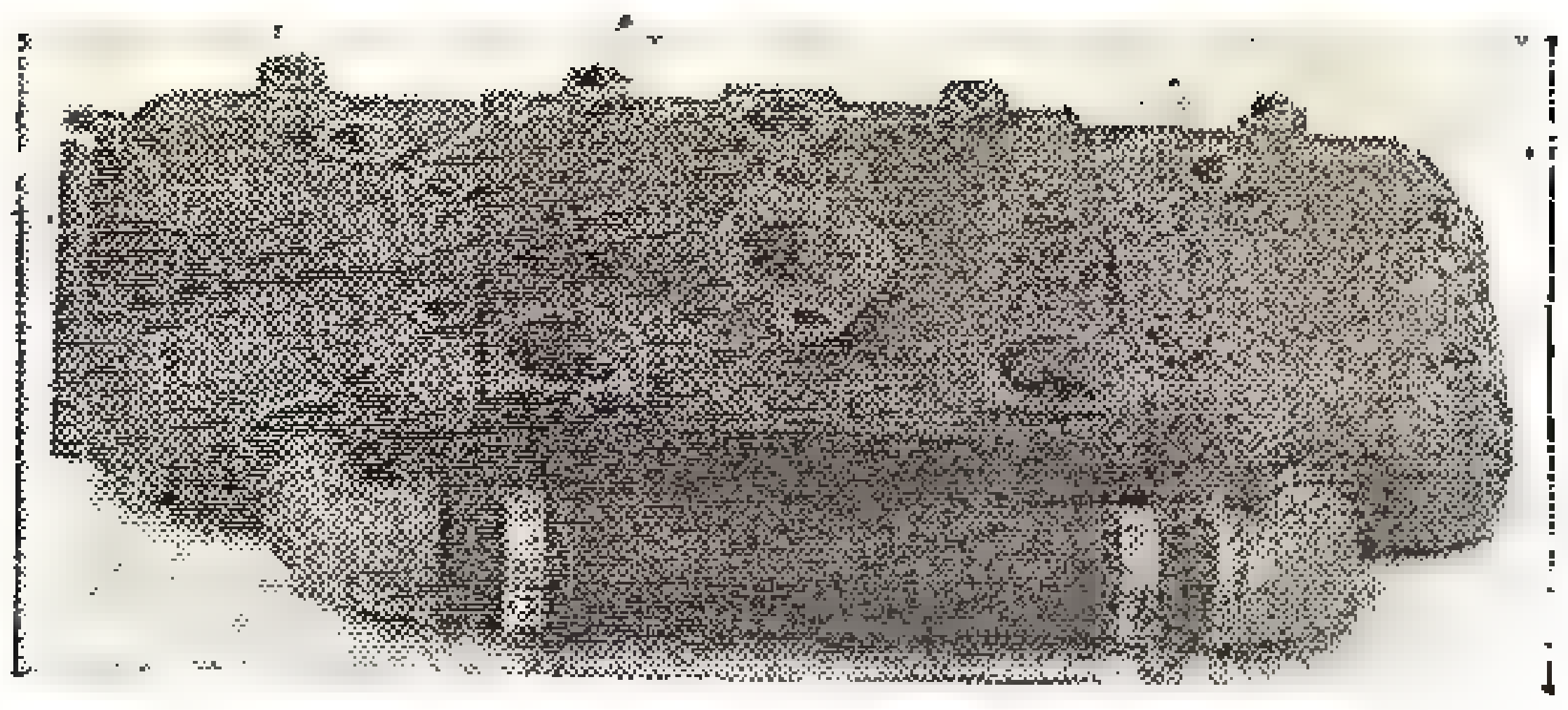

COMPRESSOR HEAD FOR MODEL A OR B FORD

New head makes self-driven compressor with 60 cubic feet capacity and 150 lbs. pressure. Only change is to cut off four valve stems in motor block. Smooth operation and long life. Operates one jackhammer with 65 lbs. pressure. Ideal for contractors, prospectors, monument workers and utilities. Used for drilling, breaking pavement, tamping, spray painting, sand blasting and general shop use.

Head with high speed compressor valves, gaskets, unloader pins and instructions on installing $35. F.O.B. plant.

GORDON SMITH BOWLING GREEN, KENTUCKY

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62 ART LESSONS

Only $1.95 POST PAID COURSE COMPLETE

Become a Talented Artist with Big Income Course also teaches commercial art, cartooning and lettering. By Alexander Murray, famous art instructor. 815 illustrations. Clear instructions. 125 sheets of drawing paper FREE. **Money Back** if not delighted after inspecting. Complete $10 course only $1.95 POSTPAID or send no money and pay postman plus postage. Order today!

EDUCATIONAL SUPPLY CO. Dept. 110-H RACINE, WIS.

METAL-WORKING LATHE

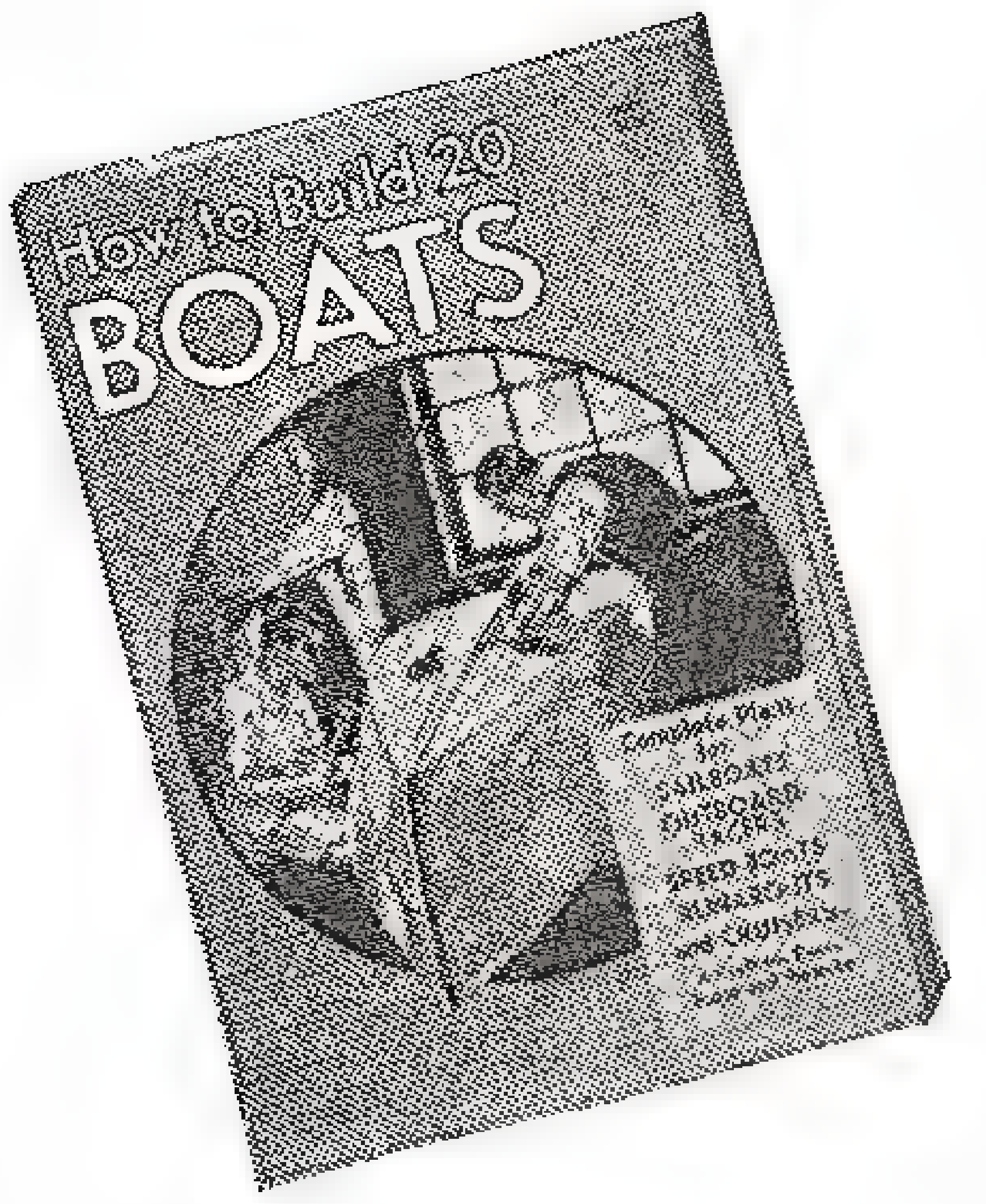
$7.50
COMPLETE

New designs and mass production methods make this amazing bargain possible. Complete metal working lathe with compound slide-rest, improved three-jaw chucking device, 6 in. swing, 24 in. overall length, 20 lbs. Send postcard for catalog and 10-day trial offer, or save time and send $1, balance plus express C.O.D. Wood-turning lathe $4.60. Extra bed lengths, 50c per ft. Attachments for milling, grinding, sanding, saw-table, etc., available at low prices.

AMERICAN MACHINE & TOOL CO., Dept. X, 200 Broadway, New York

Build Your Own Boat!

You can easily construct any boat, from an outboard to a big cruiser, by following the simple instructions, plans, and complete details given in—

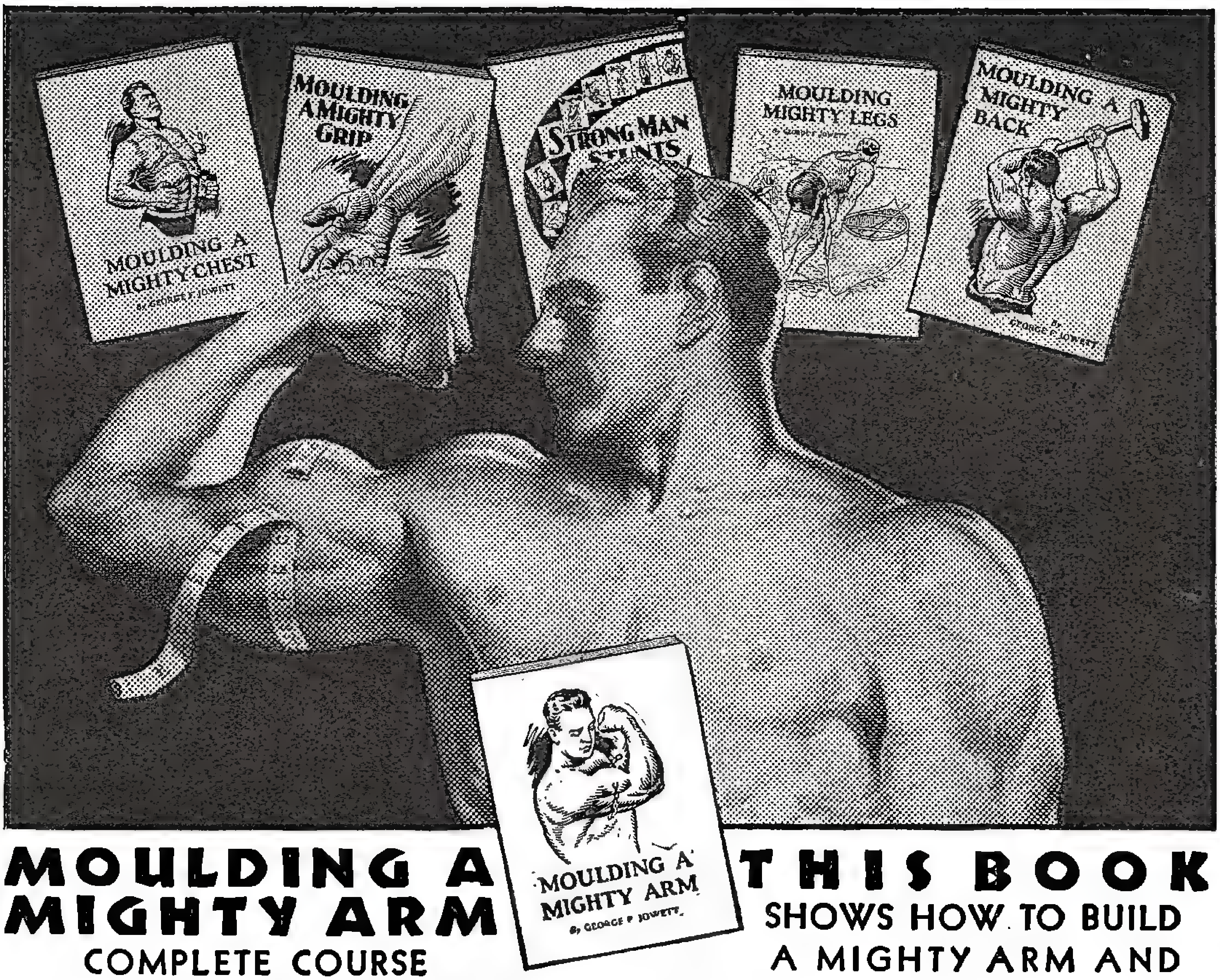


HOW to BUILD 20 Boats

●

If your newsdealer is sold out, send 50 cents to FAWCETT PUBLICATIONS, INC., 529 South 7th Street, Minneapolis, Minn.

50c at All Newsstands



MOULDING A MIGHTY ARM

COMPLETE COURSE ON ARM BUILDING

THIS BOOK

SHOWS HOW TO BUILD A MIGHTY ARM AND A 16 INCH BICEP

ONLY 25c

GET AN ARM of might with the power and grip to obey your physical desires. I have taken weaklings whose arms were scrawny pieces of skin and bone and in a very short time developed them into men of powerful proportions with bulging biceps and brawny forearms. He-men with strong, solid arms of power that are respected by men and admired by women! I don't mean just a 16-inch bicep but a 15-inch forearm and a powerful 8-inch wrist.

PROVEN, SCIENTIFIC TRAINING!

This course is specially planned to build every muscle in your arm! It has been scientifically worked out for that purpose. Many of my pupils have developed a pair of triceps shaped like a horseshoe, and just as strong, and a pair of biceps that show their double head formation. The sinewy cables between the biceps and elbow are deep and thick with wire cable-like ligaments. The forearm bellies with bulk, the great supinator lifting muscles become a column of power, and their wrists are alive and writhe with cordy sinew. Start now to build a he-man's arm!

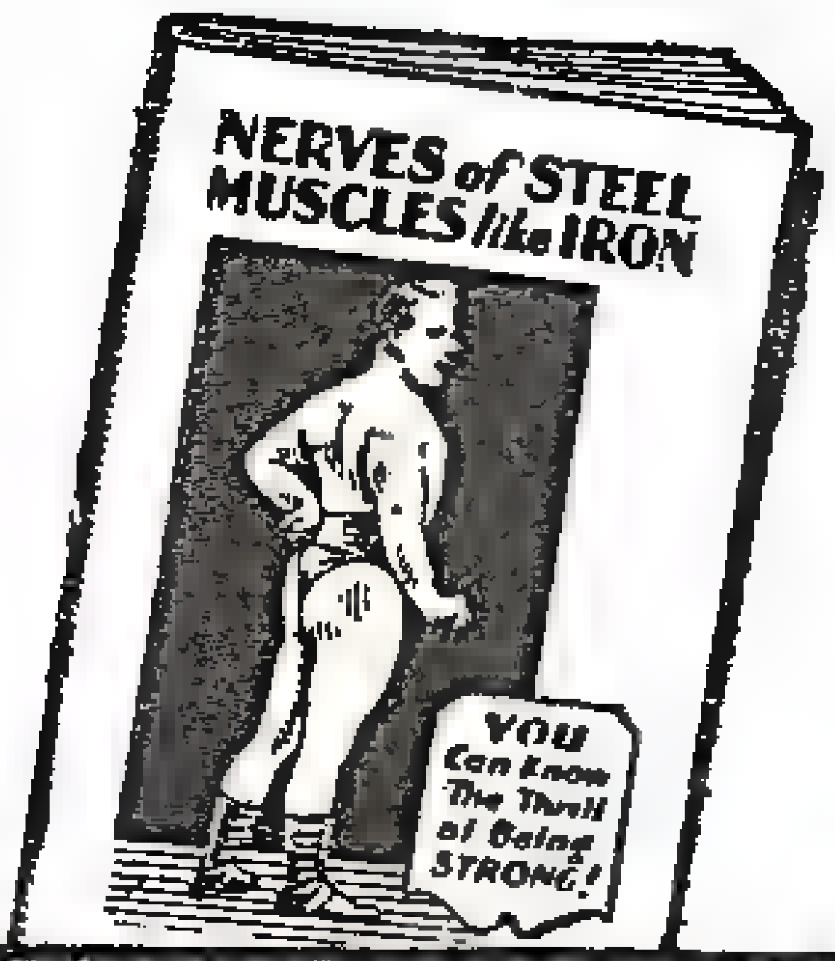
THE SECRETS OF STRENGTH REVEALED

You can't make a mistake. The reputation of the strongest armed man in the world stands behind this course. I give you my secret methods of strength development illustrated and explained as you like them. Mail your order now while you can still get this course at my introductory price of only 25c.

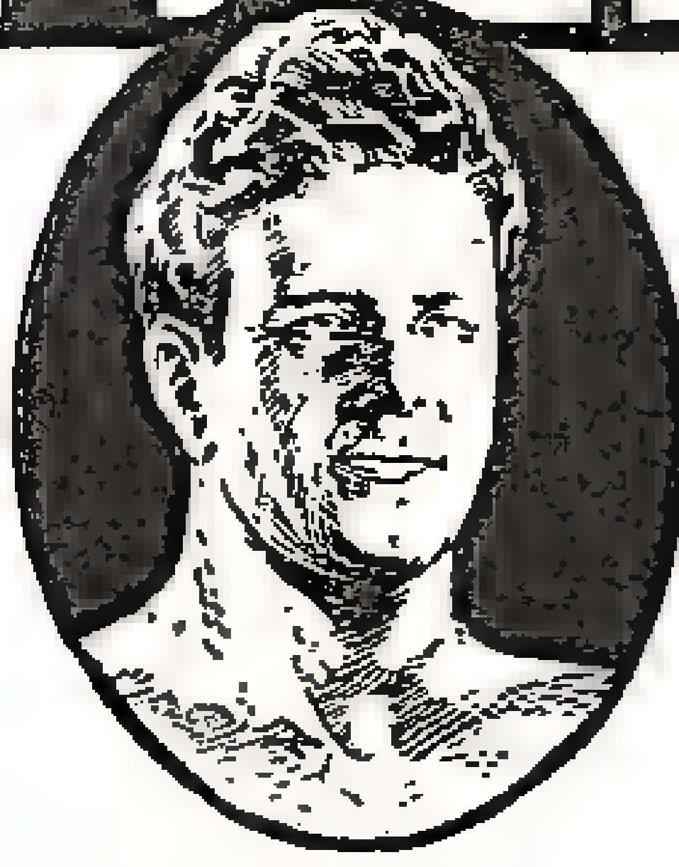
I will not limit you to the arm. Try any one of my test courses listed below at 25c. Or, try all of them for only $1.00.

Rush the Coupon Today!

I will include a *FREE COPY* of *"NERVES OF STEEL, MUSCLES LIKE IRON"*. It is a priceless book to the strength fan and muscle builder. Full of pictures of marvelous bodied men who tell you decisively how you can build symmetry and strength the Jowett Way!-Reach Out... Grasp This Special Offer!


NERVES of STEEL MUSCLES like IRON
YOU Can Know The Thrill of Being STRONG!

FREE BOOK WITH PHOTOS OF FAMOUS STRONG MEN



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"Champion of Champions"
Winner of many contests for strength and physical perfection!

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George F. Jowett: Send, by return mail, prepaid, the courses checked below for which I am enclosing______

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☐ All 6 Books for $1.00.

Name ________________ *Age* ______

Address ______________________

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Rates for classified ads, 10c per word per insertion. Minimum 10 words. Cash should accompany order. Closing date first of second month preceding date of issue. Address Classified Mgr., Modern Mechanix and Inventions, 529 7th St. So., Minneapolis, Minn.

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TEN Practical and inexpensive changes converting Dodge 12-V, Ford T, A, Chevrolet Delco 6-V generators into 100-500 watt capacity A.C. generators, or into 32-110-V. D.C. motor or generator. Dodge is 500-W self-excited. All in one book illustrated with complete simplified instructions and drawings for only $1. Autopower, 412 S. Hoyne Ave., Chicago.

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FREE NEW advertisers rate guide. Brown Advertising Agency, 140 South Dearborn, Chicago.

ADVERTISE: 24 words in 250 newspapers $10. Lists Free. Advertising Service Bureau, 4650 Drexel, Chicago.

ADVERTISE! 100 Co-operative magazines 5c word. Samples; stamp. Bryant, B33—MI, Hays, Kans.

AGENTS WANTED

AGENTS' Gold Sign Letters for store windows. 500% profit. Free sample. Metallic Letter Co., 426 N. Clark, Chicago.

BIG MONEY and Fast Sales. Every owner buys Gold Initials for his auto. You charge $1.50; make $1.45. Ten orders daily easy. Write for particulars and free sample. American Monogram Company, Dept. 11, East Orange, New Jersey.

BIG MONEY applying gold initials on automobiles. Easiest thing today. No experience needed. Free samples. "Ralco," 1084 Washington, Boston, Mass.

PENNY each, any size! Gold window sign letters. 2500% Profit. Easily applied. Free samples. Atlas Sign Works, 7941-G. Halsted, Chicago.

CASH Income Daily Resilvering Mirrors at Home. Replating autolights, reflectors, tableware, etc. Outfit furnished. Write Sprinkle, Plater, 850, Marion, Indiana.

AGENTS: Make 600% Profit Selling Cleaner, Polish, Shampoo, Vanilla, Tonic Laxative, Spot Remover, etc. Your name on labels. Free sample. Standard Chemical, Dept. P-84, Dayton, Ohio.

AGENTS: Smash go prices! Santos Coffee 12c lb. 4-oz. vanilla 8½c. $1.00 size Tonic 14c. 60c size Shampoo 8½c. 100 sticks Chewing Gum 12c. Christmas Cards, 21 in box, 14c. 150 other bargains. Experience unnecessary. Write Carnation Co., MN, St. Louis, Missouri.

FREE literature describing many business plans. D-Belfort, 4042 N. Keeler, Chicago.

AUTO POLISH Formula, 800% profit. Full information free. Write Vanart Co., Box 36, Fruitvale Station, Oakland, Calif.

SELL Colored Folks: Hair Straightener, Bleach Cream, Perfumes, Incense, 300 Products. Write for Free Samples. Big Money Making Offer. Valmor, 5249 SM Cottage Grove Ave., Chicago.

500% PROFIT! Gold and Colored sign letters for windows, offices, trucks, signs. Monograms. Easily applied. Neonite, Akron, Ohio.

CLEAN-E-ZE Polishing Cloth sells on sight, sample free. Para-Sweet Co., Pleasantville, N. J.

$2 TO $15 profit per sale. Everyday necessity for men and women. No investment. Wonderful opportunity. Act quick. U. S. Supply, 5144 Cornelia, Chicago.

AGENTS WANTED to advertise our goods, distribute introductory packages and supply steady consumers on protected routes. Unusual chance to make $37.50 a week. Write Albert Mills, 4513 Monmouth, Cincinnati, O.

GOOD Income plating auto parts, reflectors, mirrors, by new method. Outfits furnished; free particulars. Gunmetal Co., Ave. H, Decatur, Ill.

MAKE MONEY. Collect $5, keep $4. Two quick selling dollar per month "hard times" life policies. Great Northern Estate Corporation, Department C, Rockford, Illinois.

AGENTS—Rubber Sundries, Liquid Latex, $2.00 Gross Prepaid. B. Nalpak, 3225 Crystal, Chicago.

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EASILY made—good market. Illustrated Instructions 10c. Supply Credit. Century Aquarium, Fullerton, Pa.

AUTOMOBILES

REPAIR with good used parts for half price. Write or wire for parts needed. Auto Salvage Garage, Fayetteville, N. C.

AVIATION

ARMY Air Corps gives free flying training, salary, expenses paid. Information booklet, how to qualify, apply, 10c. Federal Equipment Co., Deerpark, Ohio.

7 Ft. GAS Powered model planes, K. D. Kit complete, less motor, $8.00 prepaid. Blueprints $1.00. 1/6 H.P. gas engine turns 16" prop. 4325 R.P.M. Complete catalog 25c coin. P. Loutrel, 96 McDonough St., Brooklyn, N. Y.

USED Airplanes $85.00 up. Literature 10c. Federal Equipment, Deerpark, O.

METAL tipped propellers; Fords, $9.98; Henderson, $8.50; Harley, untipped, $4.50; New production ships, $98.00; Aeronca Type 40 H.P. motors, $98.00, including propeller. Photos, information including leather bound flying manual, 25c. Hibbs, Ft. Worth, Texas.

AVIATION—Airminded young men interested in entering the field of aviation as apprentices. Write, enclosing stamp. Mechanix Universal Aviation Service, Dept. A-12883 Mansfield, Detroit, Mich.

LORENZEN Propellers for your Airplane will increase performance. The race pilots' choice. New circular, dime. Lorenzen Propeller Company, Niles, Michigan.

100 AIRPLANES $80 up, flyaway. Repairable crackups, $60 up. Send 20c for complete list. Used Aircraft Directory, Athens, Ohio.

1933 FLYING MANUAL, 146 page book of light plane and glider plans, still available at 50c. Modern Mechanix Pub. Co., Minneapolis, Minn.

BICYCLES

ELECTRIC Bicycle is real sport, noiseless, original, Convert yours. 3-18 mph. Complete plans, photographs. 25c coin. Electrobike, b, 2333 Honolulu, Hawaii.

BLUEPRINTS

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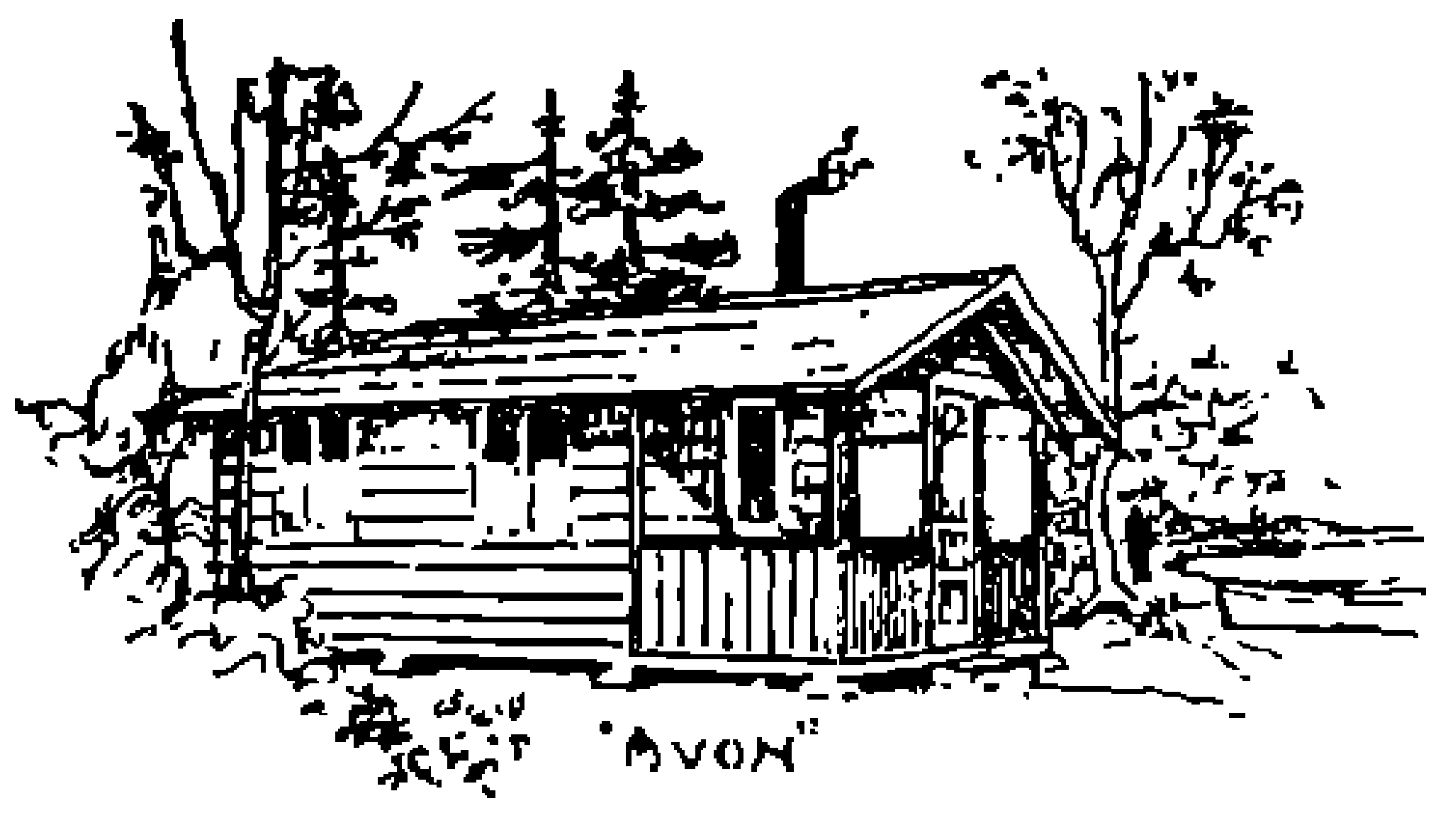

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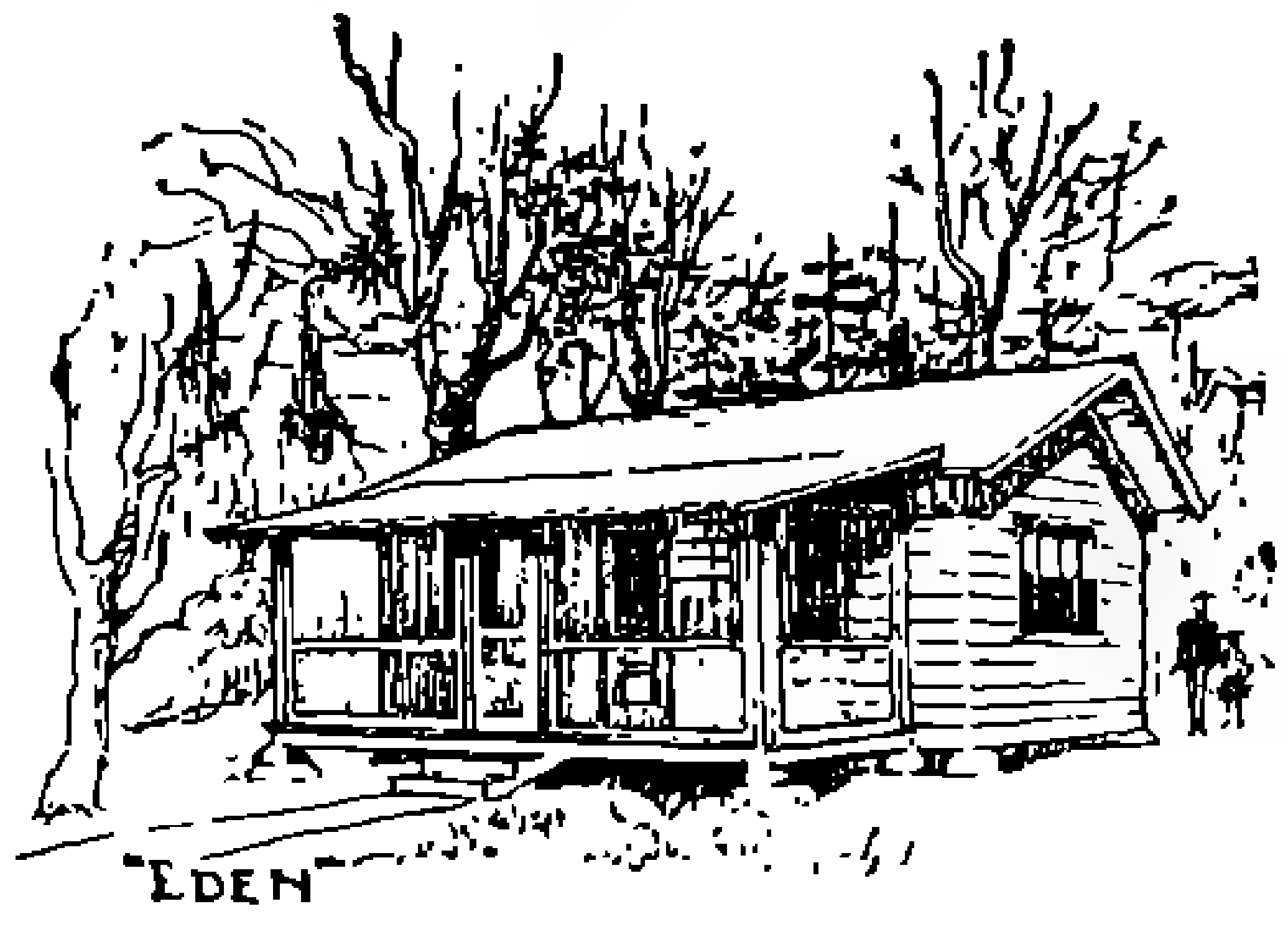

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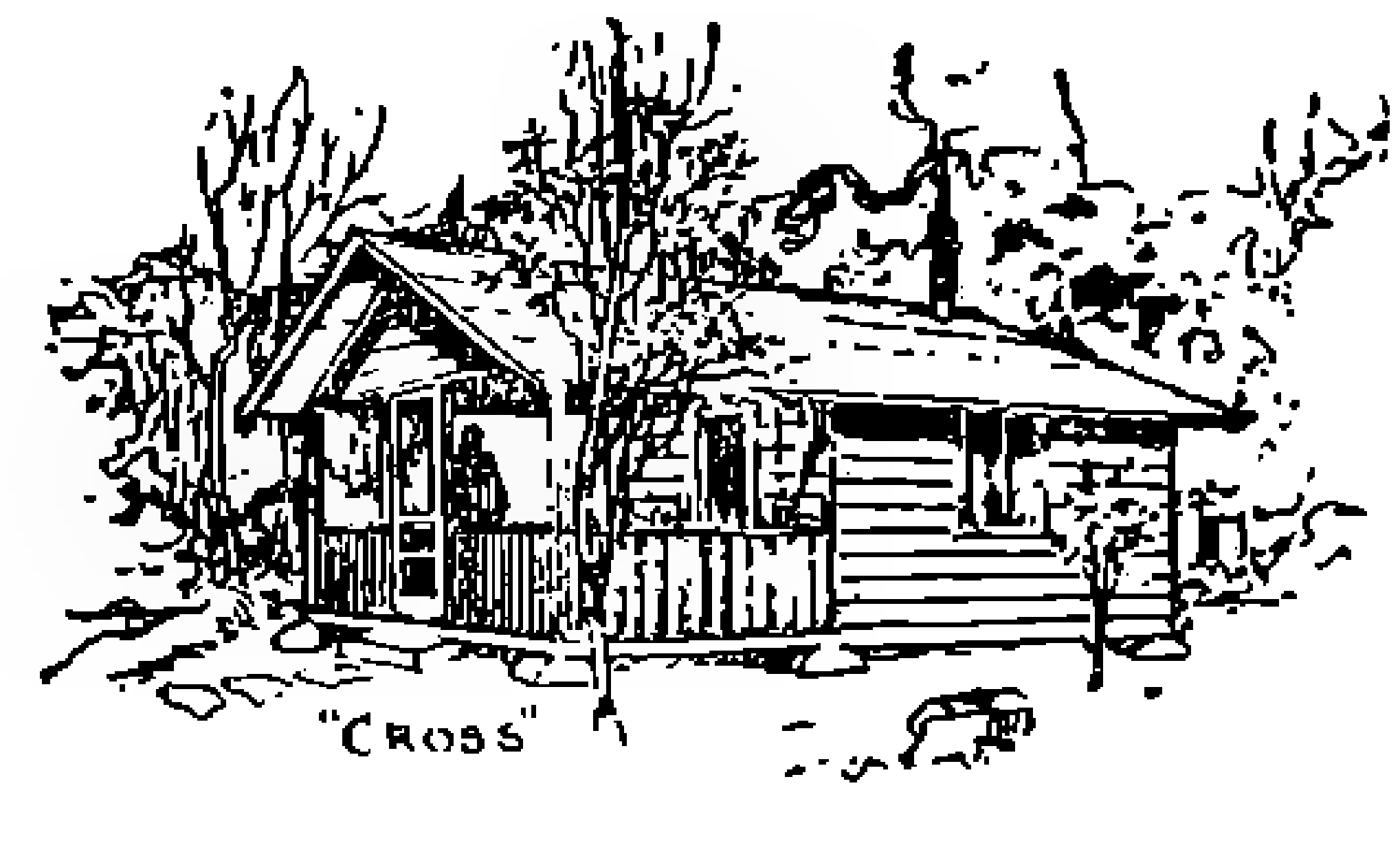

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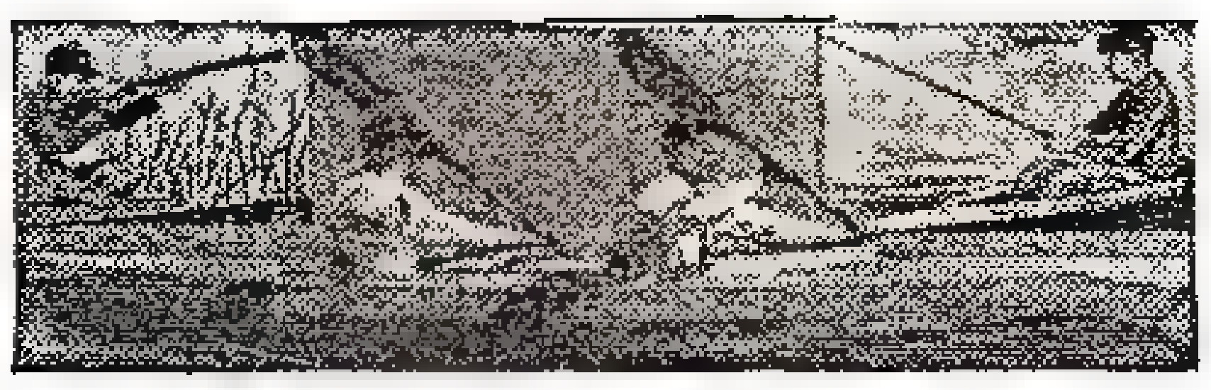

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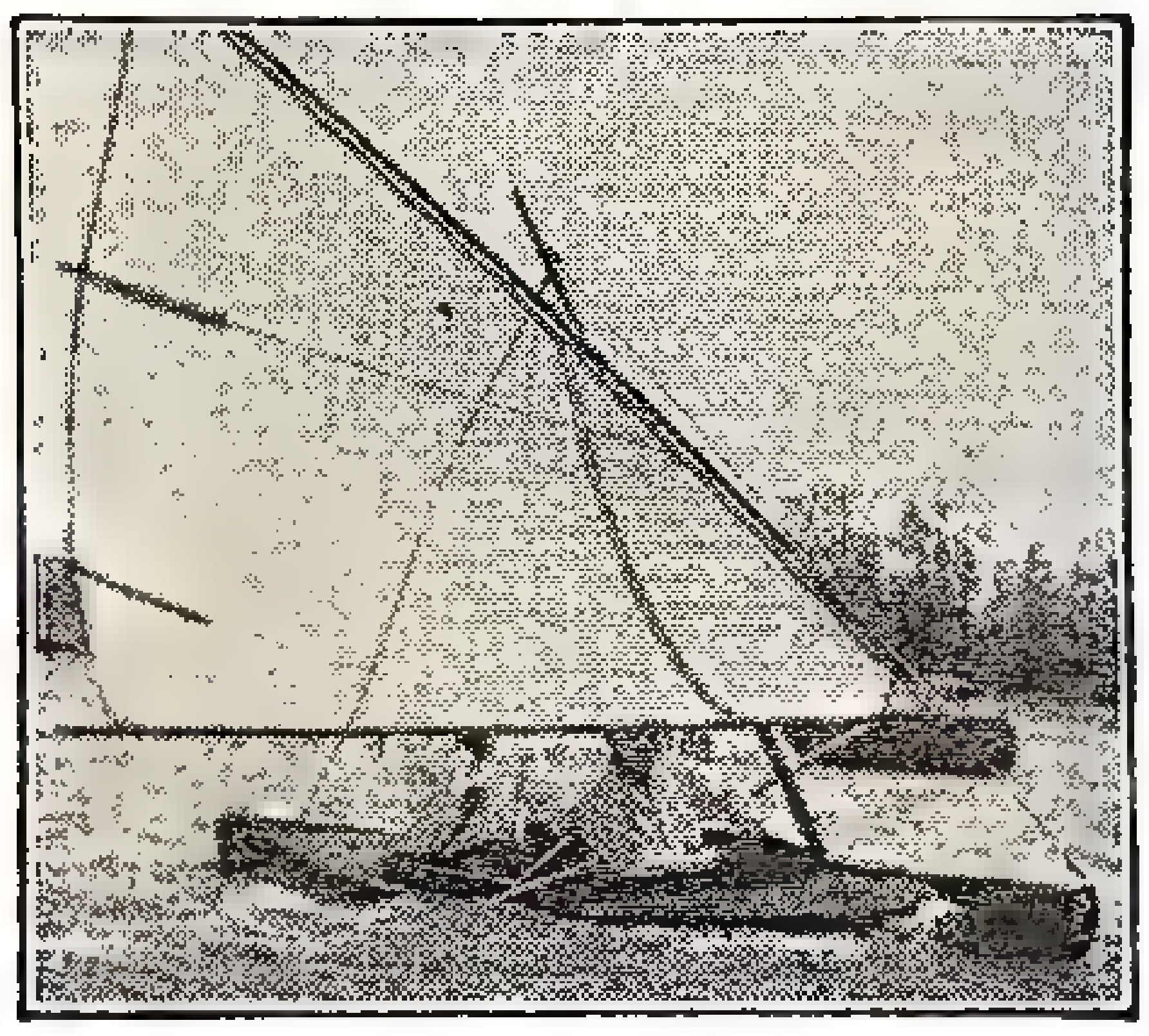

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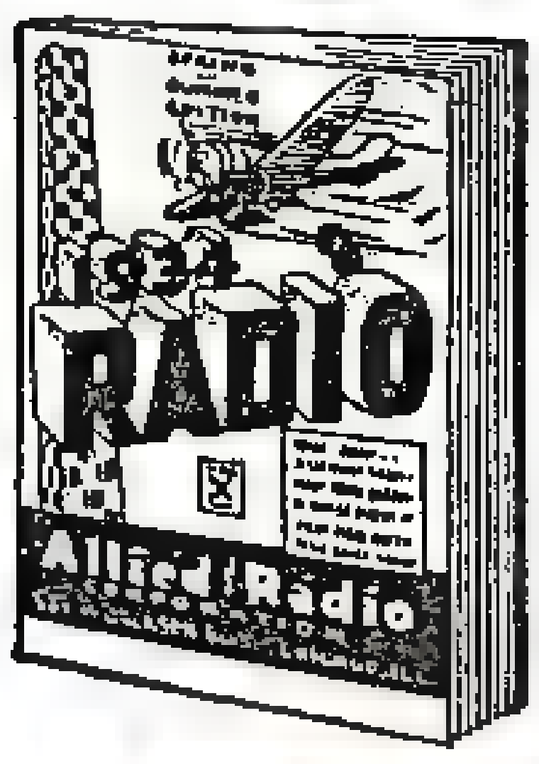

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Mr. Way made himself hear his watch tick after being deaf for twenty-five years, with his Artificial Ear Drums. He wore them day and night. They stopped his head noises. They are invisible and comfortable, no wires or batteries. Write for TRUE STORY. Also booklet on Deafness.

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AT HOME You can learn by our modern and original system of instruction every part of the **Watch Repairing Trade** at home as good or better than at a shop. You can earn money while learning and secure a well paying position or start in business after completing our course of instruction. Good watch repairers are always in demand and earn very good salaries. For particulars apply to the

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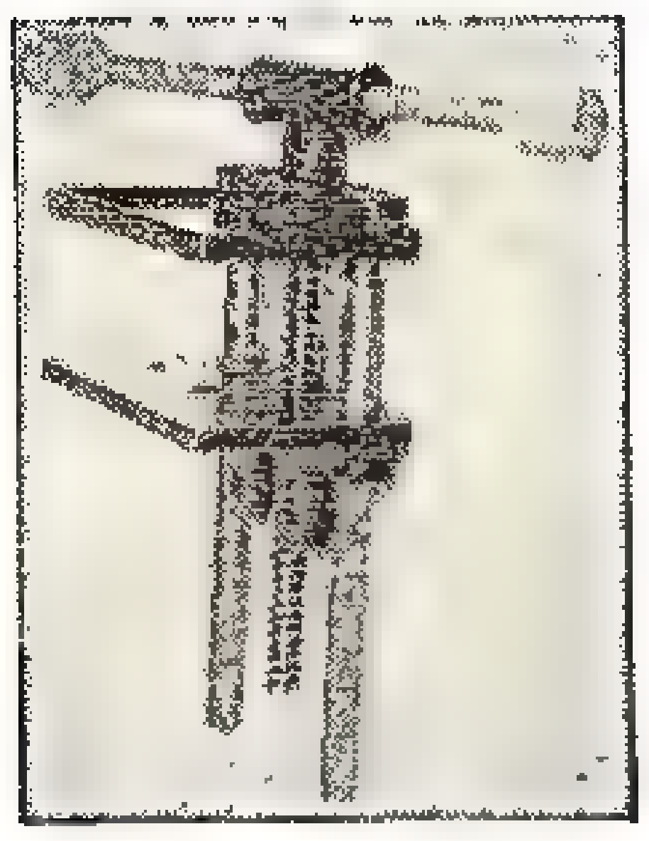

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carefully and accurately finished. Width of jaws 6", depth of jaws 2⅝", opens 6". Weight 6 lbs. A strong rugged Vise that will give lasting service. Special price $1.39 prepaid. West of Rockies $1.79. Order this Vise now from

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Every motorist wants night Driving Protection. Amazing simple invention, called Mirror-Lites, fits any make of headlight bulb. Kills that dangerous glare. Attached in a jiffy. Focuses and intensifies the light. Puts new life in old reflectors. Chromium plated, outlasts the car. The cheapest night driving insurance ever offered. Sold on money back guarantee. Retails 50c a pair. Sample pair, 25c, prepaid.

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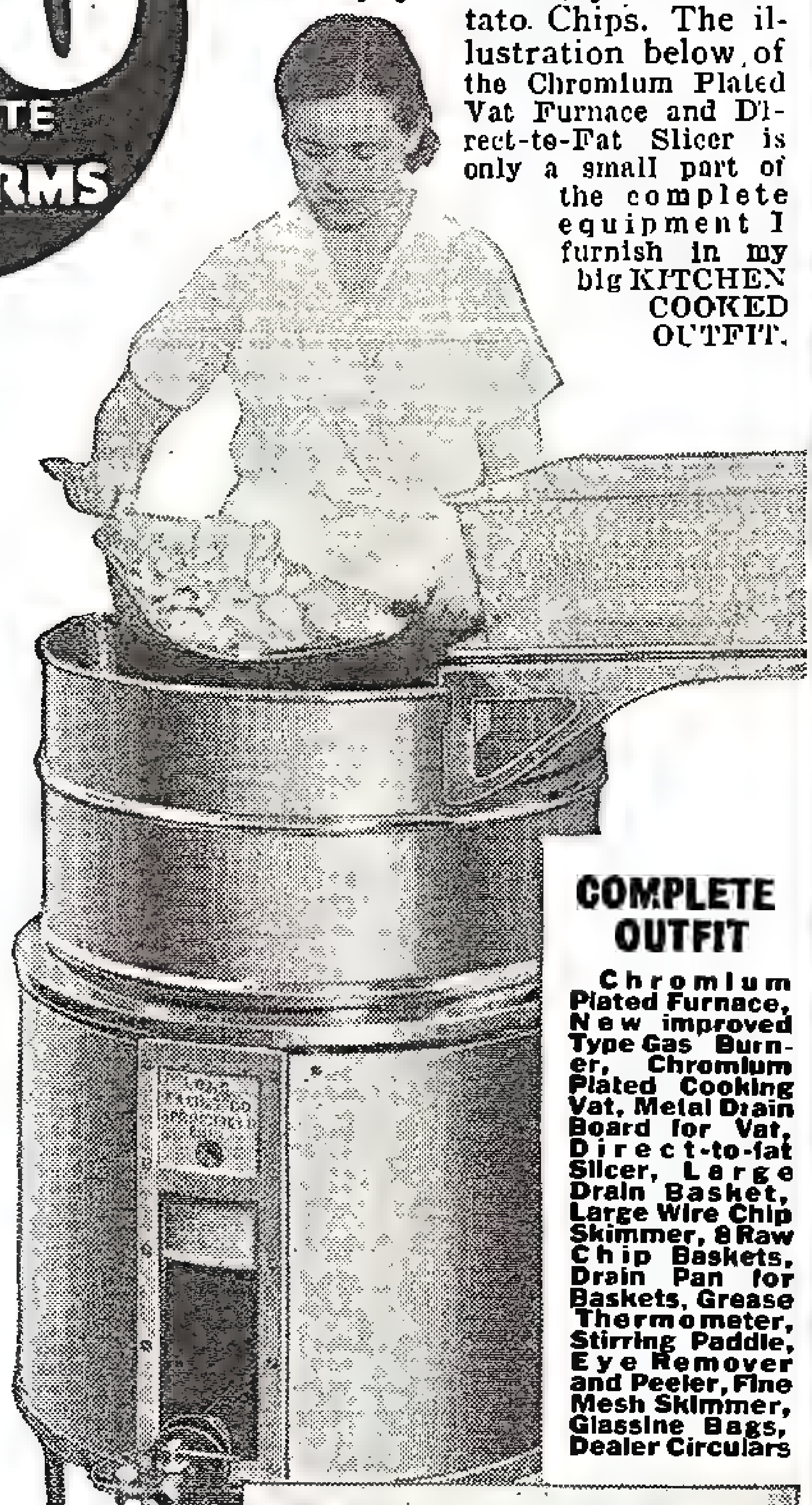
A new, fast way to have plenty of money to pay your bills—meet the mortgage—live well—BE YOUR OWN BOSS. Make 500 to 600 Per Cent INCREASE on raw materials—keep up to 80c out of each dollar you take in. Start right in your own home or in a vacant store—any place where you have a few square feet. My NEW SIMPLIFIED METHOD and COMPLETE OUTFIT starts you in a permanent, profitable business manufacturing four tasty foods—delicious crisp Potato Chips, Cheese Chips, Do-Nuts and Salted Nuts. You begin making money at once. No experience needed. I place 50 years of Successful Experience of LONG-EAKINS COMPANY behind you to assure your success.

AS LOW AS
$130
COMPLETE
EASY TERMS

Here's another way to take your town by storm—set this BIG, ATTRACTIVE LOOKING OUTFIT up in a show window and see the crowds gather round. Let the people see the delicious Potato Chips or Do-Nuts tumbling out, and they will crowd around you in droves and buy your factory fresh Potato Chips. The illustration below of the Chromium Plated Vat Furnace and Direct-to-Fat Slicer is only a small part of the complete equipment I furnish in my big KITCHEN COOKED OUTFIT.



COMPLETE OUTFIT

Chromium Plated Furnace, New improved Type Gas Burner, Chromium Plated Cooking Vat, Metal Drain Board for Vat, Direct-to-fat Slicer, Large Drain Basket, Large Wire Chip Skimmer, 8 Raw Chip Baskets, Drain Pan for Baskets, Grease Thermometer, Stirring Paddle, Eye Remover and Peeler, Fine Mesh Skimmer, Glassine Bags, Dealer Circulars

I Plan the Selling for You—You Supervise and Collect the Profits

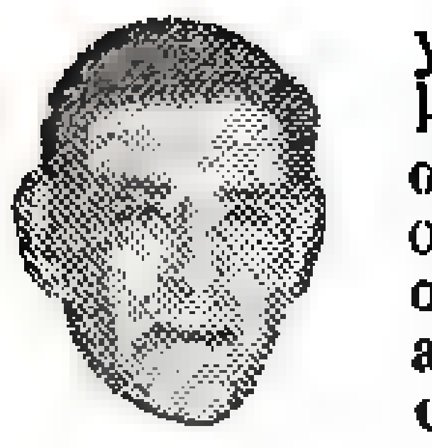
Be a Wholesaler — make established dealers your salesmen. I have Brand New, Sure Fire selling plans. All you do is tell the dealers about this plan—and the PROFITS START ROLLING IN. With my new plan you can also have every boy and girl in town selling Potato Chips for you. This plan is so simple, you can instantly see it will make you famous over night. Groceries, Delicatessens, Restaurants, Bakeries, Soda Fountains, Drug Stores, Confectionery Stores and scores of other dealers do all the retailing for you. Dealers everywhere waiting to be supplied. COMPLETE INSTRUCTIONS. Formulas direct from my Testing Plant in Springfield—all furnished to you.

PAY AS YOU EARN—

Low Easy Terms

I make terms to good, honest, industrious people who show me they want to make money quick. You don't need a lot of money to start —get it back the first few days you operate. A bag of potatoes, some cooking fat, and a little salt, and you are ready to go. EVERYTHING FURNISHED to start for less than a down payment on a cheap car. CASH COMES BACK QUICK.

READ What Indiana Operator Says F. A. PEOPLES

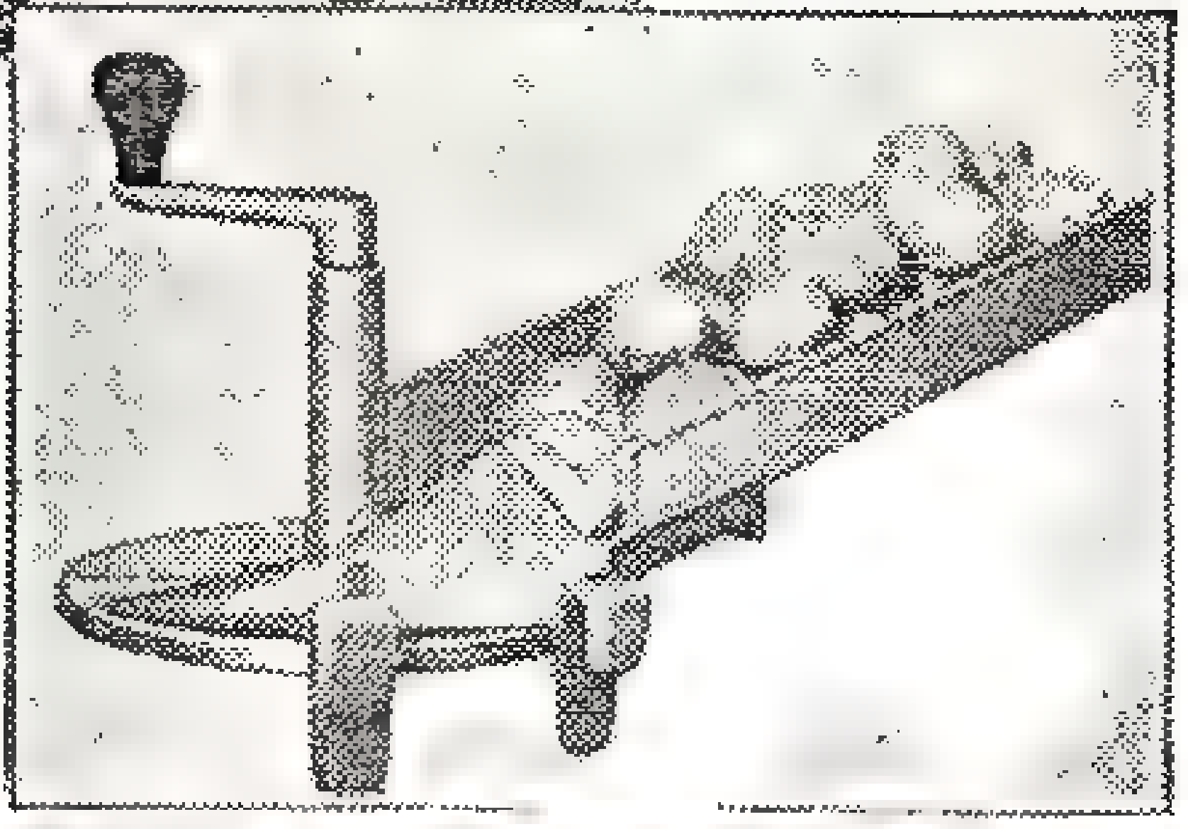


"For the past six years I have been knocking about on one thing to another—all the time on the lookout for a substantial and dependable business, which could be established with small capital. In looking through a magazine, I came upon an advertisement of the Long-Eakins Company, located in Springfield, Ohio. I went over there and was perhaps over-cautious and in all, made three trips before deciding I was on the right track. I have had this outfit in operation for just seven days and to say I am both surprised and delighted is putting it mild—selling all the Chips I can make."

500% INCREASE

On Raw Materials

Actual tests show $8.00 CASH SALES from 63c Raw Potatoes, made into Chips. My specially constructed Cooking Vat gives Outfit greatly increased capacity. Fries 16 ounces fine Quality, Finished Chips in FOUR MINUTES. Many food authorities are now recommending the sale of unpeeled Chips because they retain the minerals found in, and under the skin of the Potato. With my new KITCHEN COOKED OUTFIT you can specialize in Mineral (unpeeled) Chips — Besides Potato Chips, you can make extra profits with Do-Nuts, Salted Nuts and Cheese Chips.



With my new improved slicer, included with this outfit, a full "frying" of raw potatoes can very quickly be sliced into the vat at one time. Slicer is attached to the frying vat so that the peeled or unpeeled potatoes fall directly into the hot fat—saves trouble of soaking and draining chips.

The LONG-EAKINS Company
Manufacturers of Carmelcrisp and Crispette Equipment
842 S. South High St. Springfield, Ohio

SEND FOR *Free* NEW BOOK

H. W. EAKINS, President,
Long-Eakins Company,
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Dear Sir:
I am anxious to make money. Send me all the facts without any obligation. Tell me how I can get in this amazing, new business, QUICK.

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HELP!!
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LET ME GO!
LOAFER

BOYS! BOYS! BOYS!

Throw Your Voice

Into a trunk, under the bed, under a table, back of the door, into a desk at school, or anywhere. You get lots of fun fooling the teacher, policemen, peddlers, and surprise and fool all your friends besides.

THE VENTRILLO

is a little instrument that fits in the mouth out of sight. Cannot be detected. It is used in connection with the above, and with the aid of this wonderful **DOUBLE THROAT**, or **VENTRILLO**, you can imitate all kinds of birds, animals, etc. Remember you get everything for **ONLY TEN CENTS**—a booklet giving you full instructions how to become a ventriloquist and throw your voice, the Double Throat, or Ventrillo, also a copy of our MONTHLY MAGAZINE, **"FUN, MAGIC AND MYSTERY."** **ALL FOR ONLY 10 cents.** *Johnson Smith & Co., Dept. 719, Racine, Wis.*

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Enjoy the concerts, baseball games, market reports, latest news, etc. This copyrighted book "EFFICIENT RADIO SETS" shows how to make and operate inexpensive Radio Sets, the materials for which can be purchased for a mere trifle. Also tells how to build a short-wave Receiver for bringing in foreign stations, police calls, ships at sea, etc. **ONLY 15c p.pd.**

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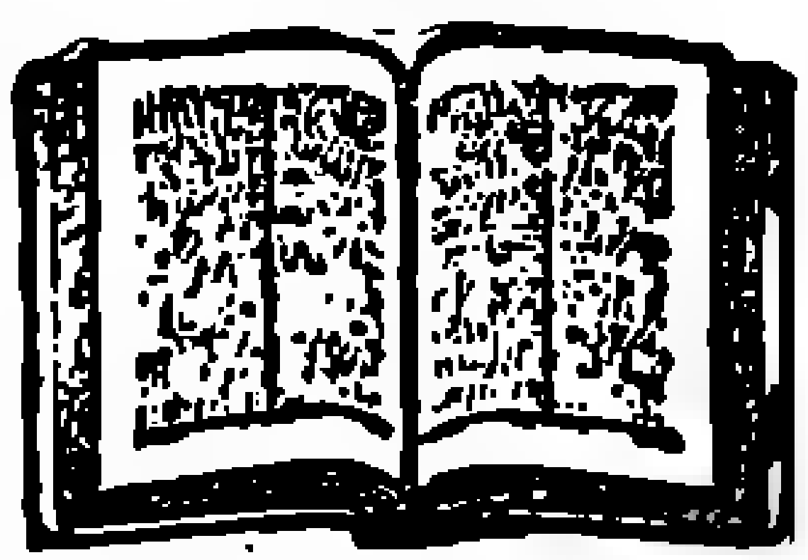

GREAT CURIOSITY Smallest Bible in the World. Size of a postage stamp. 200 Pages. Said to bring good luck to the owner. A genuine work of art. Must be seen to be appreciated. Make good money selling them to friends, church acquaintances, etc. PRICE 15c each, 3 for 40c, 12 for $1.35, 100 for $7.50. Also obtainable in Leather Binding, with gold edges. **Price 50c each, 3 for $1.25, $4.50 per doz. Magnifying Glass for use with Midget Bible 15c**

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Box contains 12 eggs. When lit with a match, each one gradually hatches itself into a snake several feet long, which curls and twists about in a most life-like manner. **Price per box. 10c postpaid. 3 for 25c.**

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With a bunch of these bills, it is easy for each person of limited means to appear prosperous by flashing a roll of these bills at the proper time and peeling off a genuine bill or two from the outside of the roll, the effect created will be found to be all that can be desired. **Prices, postpaid: 40 Bills 20c, 120 for 50c, or $3.50 thousand postpaid.**

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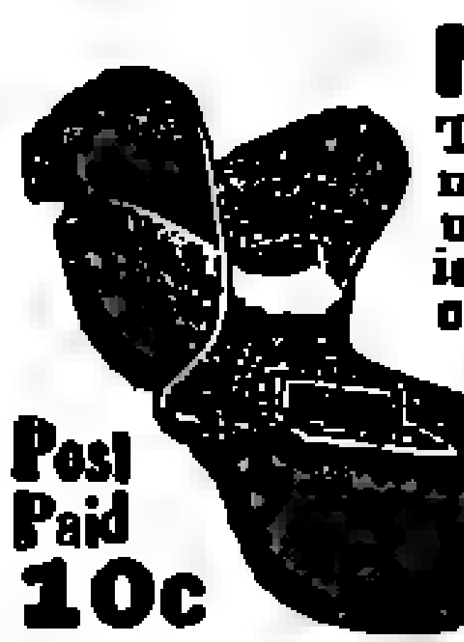

Post Paid 10c

The Magic Nose Flute, or Humanatone, is a unique and novel musical instrument that is played with nose and mouth combined. There is just a little knack in playing it which, when once acquired after a little practice, will enable you to produce very sweet music that somewhat resembles a flute. There is no fingering, and once you have mastered it you can play all kinds of music with facility and ease.

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250 MAGIC TRICKS

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An excellent little book containing nearly 300 tricks for parlor or stage that anyone can do. Tricks with cards, coins, handkerchiefs, eggs, bottles, string, etc. Also Second Sight, Shadowgraphy, etc. Profusely illustrated. **10c postpaid.**

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More fun than fighting with your wife. Look just like ordinary matches. As the victim tries to light one he gets quite a surprise.

10c

Price 10c per box, 3 boxes for 25c, 12 for 75 cents.

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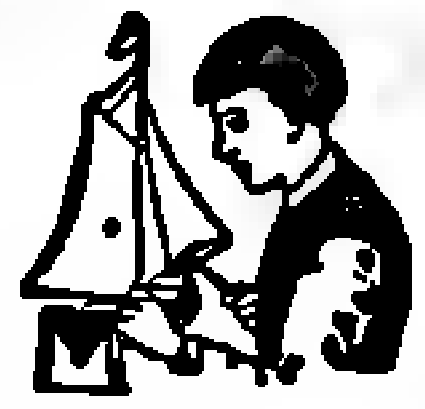

Greatest boys' book written. Tells how to make a Pinhole Camera, a Canoe, model Railroad, a Telephone, Boomerang, Telegraph Instrument, Box Kite, Talking Machine, Microscope, Electric Motor, Electric Door Bell, Water Wheel, Paddle Raft, a pair of Skis, a Dog Sled, Bird House, Rabbit Yard, etc. 64 pages. 160 illustrations. **PRICE 10c.**

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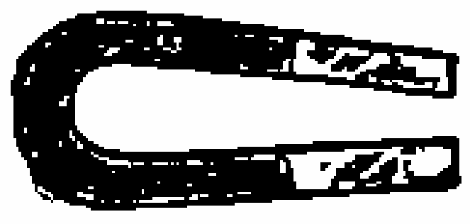

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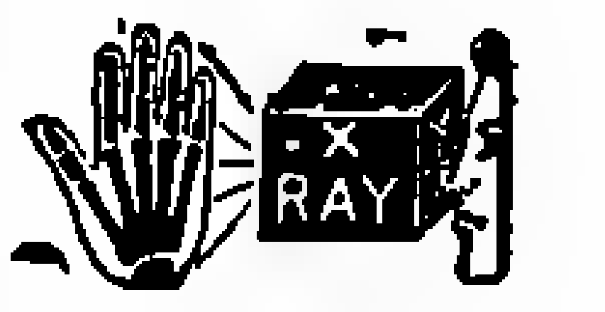
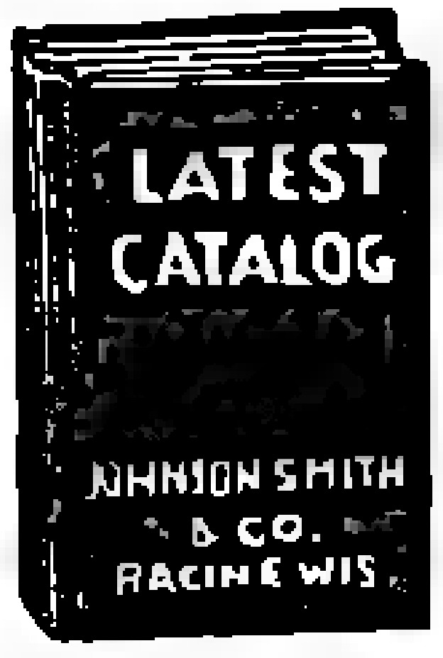


A wonderful little instrument producing optical illusions both surprising and startling. With it you can see what is apparently the bones of your fingers, the lead in a lead pencil, the interior opening in a pipe stem, and many other similar illusions. **Price 10c, 3 for 25c.**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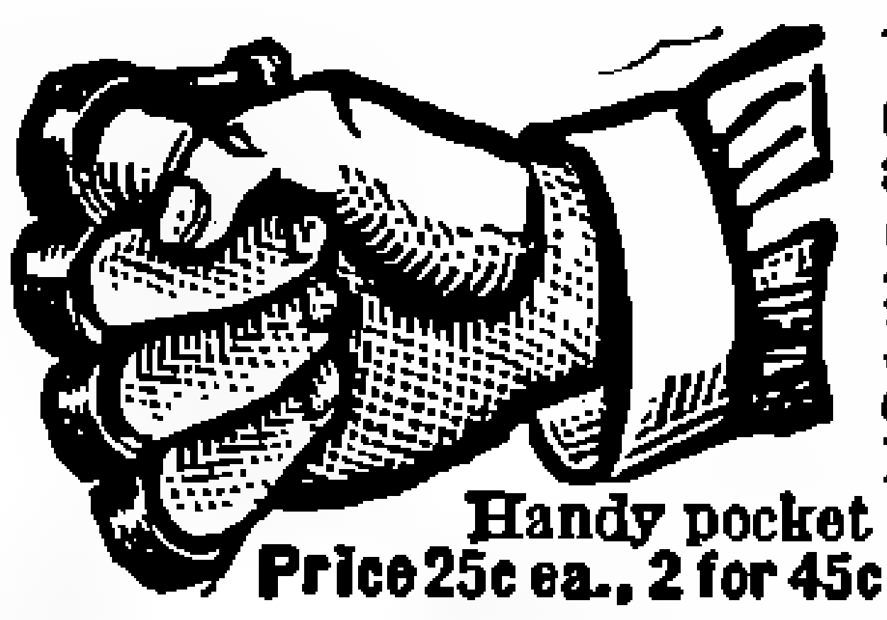

Used by police officers, detectives, sheriffs, night watchmen and others as a means of self-protection. Very effective. Easily fits the hand, the fingers being grasped in the four holes. Very useful in an emergency. Made of aluminum they are very light, weighing less than 2 ounces. Handy pocket size always ready for instant use. **Price 25c ea., 2 for 45c postpaid.** ***770 page Catalog 10c.***

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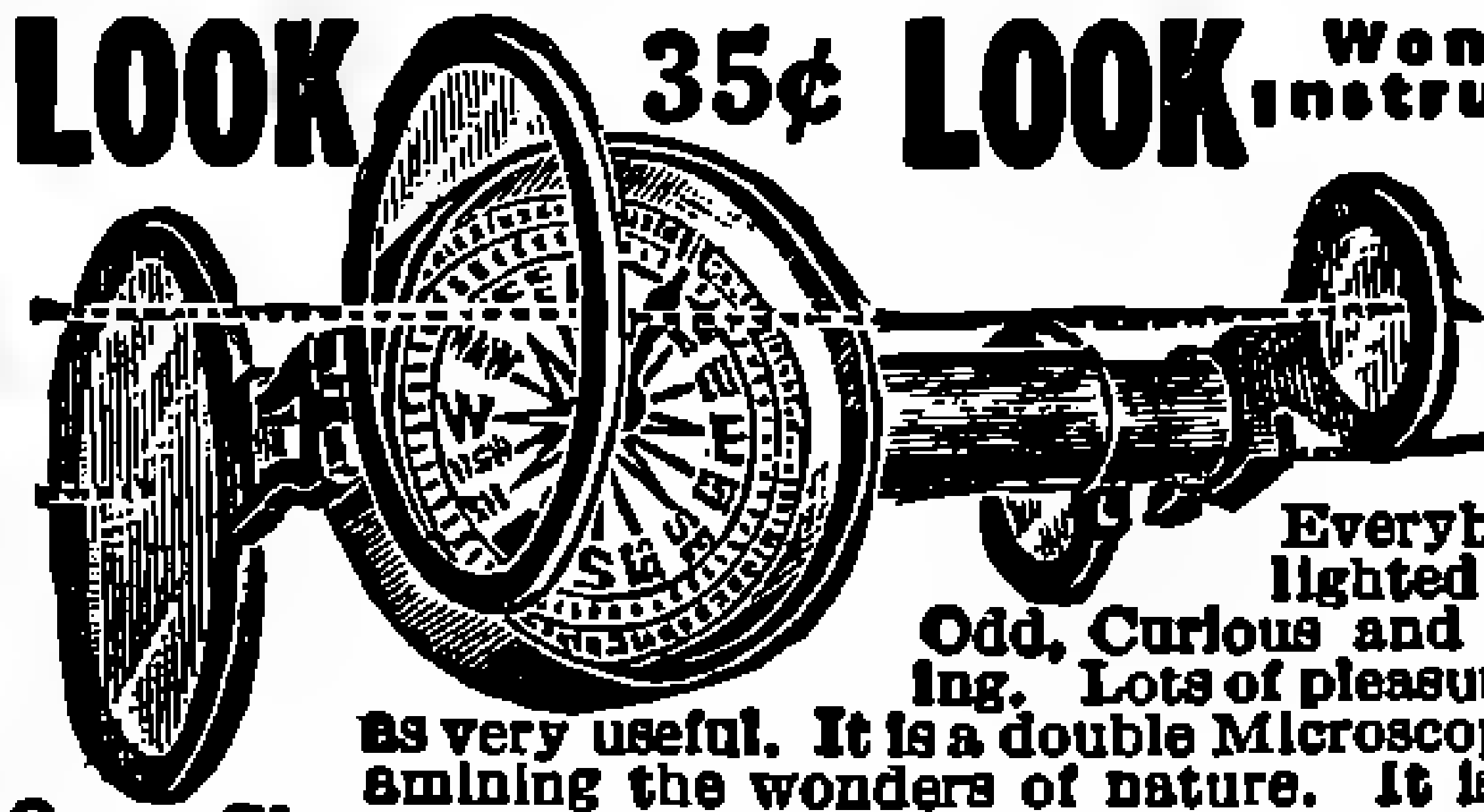
Wonderful instrument.



Greatest thing yet. Nine separate articles in one. Everybody delighted with it. Odd, Curious and interesting. Lots of pleasure as well as very useful. It is a double Microscope for examining the wonders of nature. It is also an Opera Glass, a Stereoscope, a Burning Lens, a Reading Glass, a Telescope, a Compass, a pocket Mirror, and a Laryngoscope—for examining eye, ear, nose and throat. It is worth all the cost to locate even one painful cinder in the eye. Folds flat and fits the pocket. Something great—you need one. Don't miss it. Sent by mail. Only 35c or 3 for $1.00.

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All Parts Necessary for Only 10c

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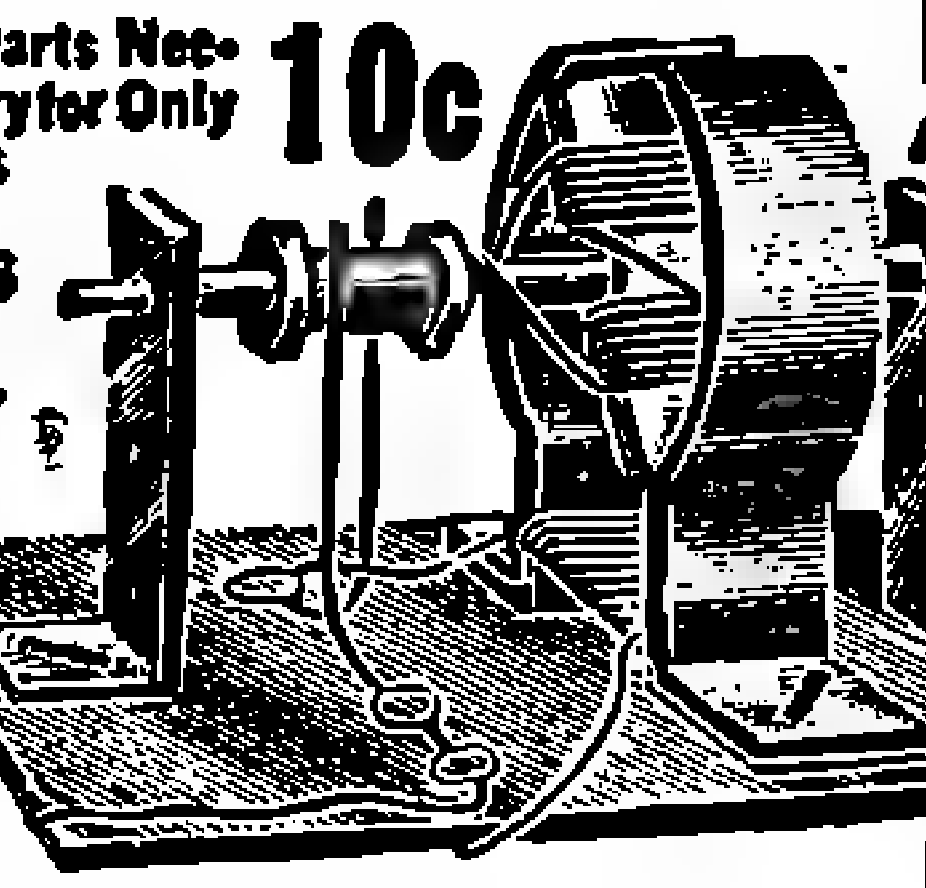

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An Electric Motor for Only 10 cents. Sounds almost unbelievable, but it is perfectly true. For ONLY 10 cents we send you all the parts necessary packed in a neat box with full printed and illustrated directions for assembling. No trouble at all putting the parts together in fact it is FUN. Just follow a few simple instructions and in a few minutes the motor is ready to run.

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and
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With the aid of this dream book and fortune-teller. The key to your future. Will you be lucky in love? Successful in business? Will you be wealthy? Complete with dictionary of dreams with descriptions and correct interpretations, with lucky numbers, fortunate days, oracles, divination, palmistry, etc. Also tells how to tell fortunes by various methods, by grounds of coffee or tea, by dominoes, by marks, scars or moles, miscellaneous games with cards, lucky days, weeks, months, years; how to receive oracles by dreams, finger nail observations, etc. **PRICE 10c**

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This remarkable book tells how. Explains all about Hypnotism, how to hypnotize, how to produce sleep, how to awaken a subject, how to hypnotize animals, hypnotism in diseases, hypnotism for scientific practice, illusions and halucinations, personal magnetism, thought transference, etc. Written in plain, everyday language that anybody can understand. **PRICE 10c postpaid.**

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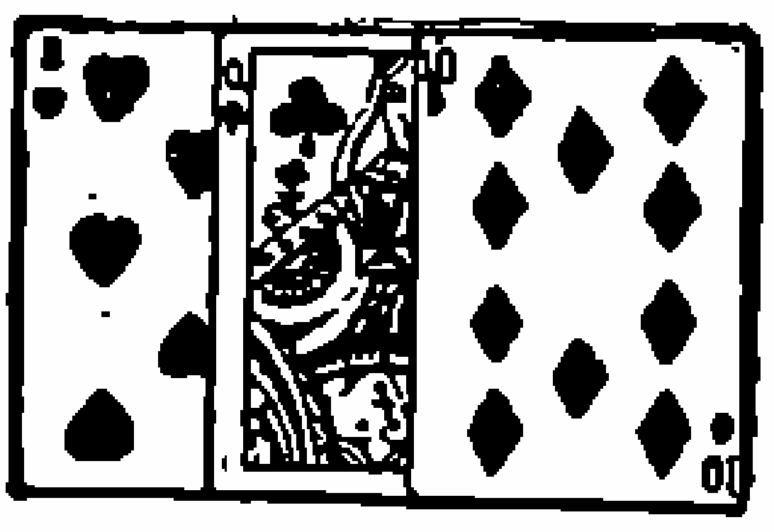
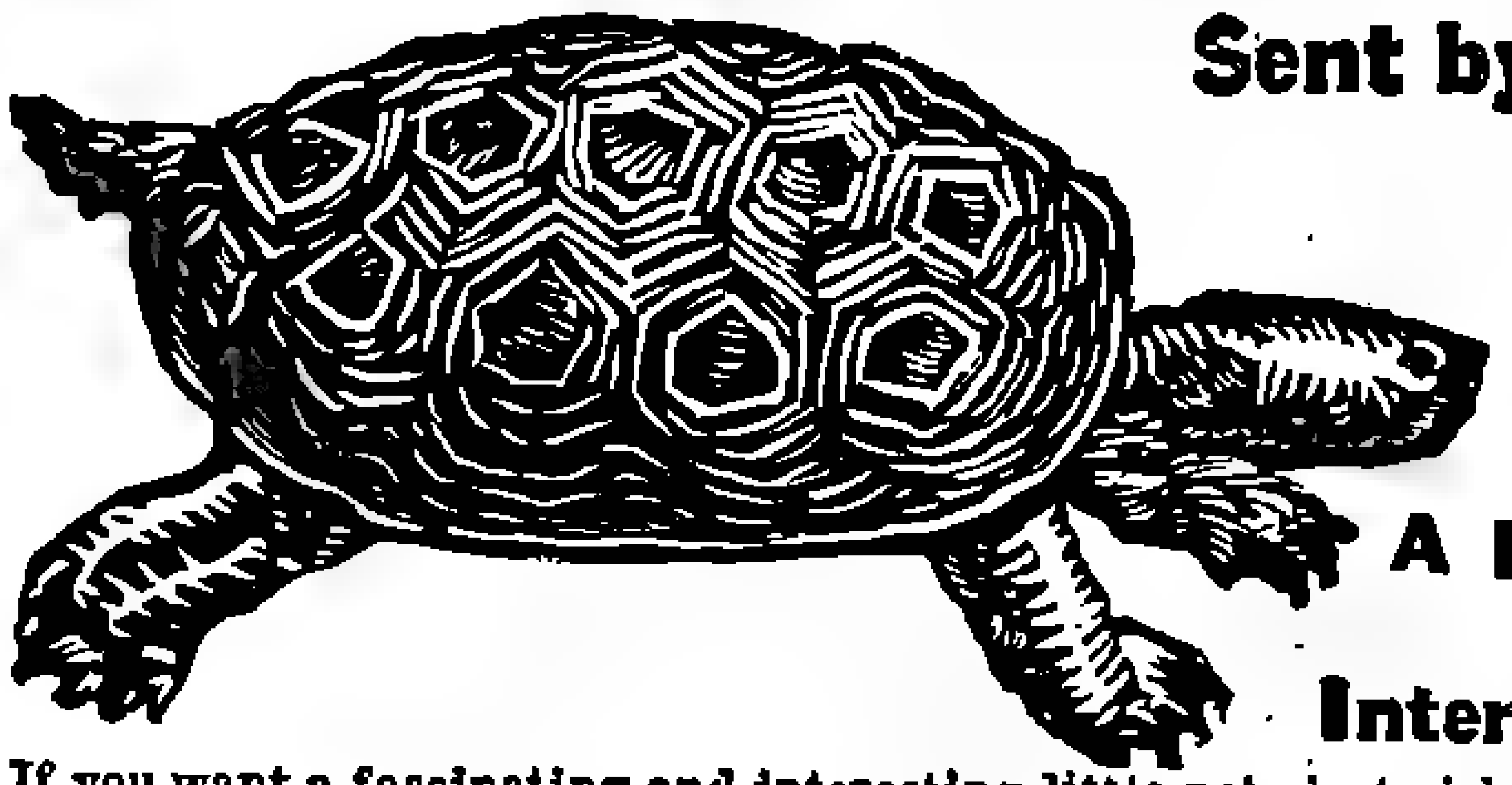


Book shows how to tell fortunes with cards, dice, dominoes, crystal, etc. Tells the meaning and signification of every card. Several different methods explained and fully illustrated. Crammed full from cover to cover with complete information on fortune-telling. **PRICE 10c postpaid.** *Stamps accepted.*

Address orders for all goods on above and on following page to JOHNSON SMITH & CO., Dept. 719, Racine, Wis.



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25c

A Fascinating and Interesting Pet

If you want a fascinating and interesting little pet, just risk a quarter and we will send you a real live **PET TURTLE** by mail postpaid to any part of the U.S.A. Now all the rage. Thousands upon thousands of these Turtles were sold at the World's Fair in Chicago. No trouble at all to keep. Just give it a little lettuce or cabbage or let it seek its own food. They are extremely gentle, easily kept and live for years and years. Needs less attention than any other pet. Get one or two. Study their habits. You will find them intensely interesting. **ONLY 25c each sent by mail.** *Special Turtle Food 10c package*

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REVOLVER STYLE

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MADE IN 3 SIZES

25c
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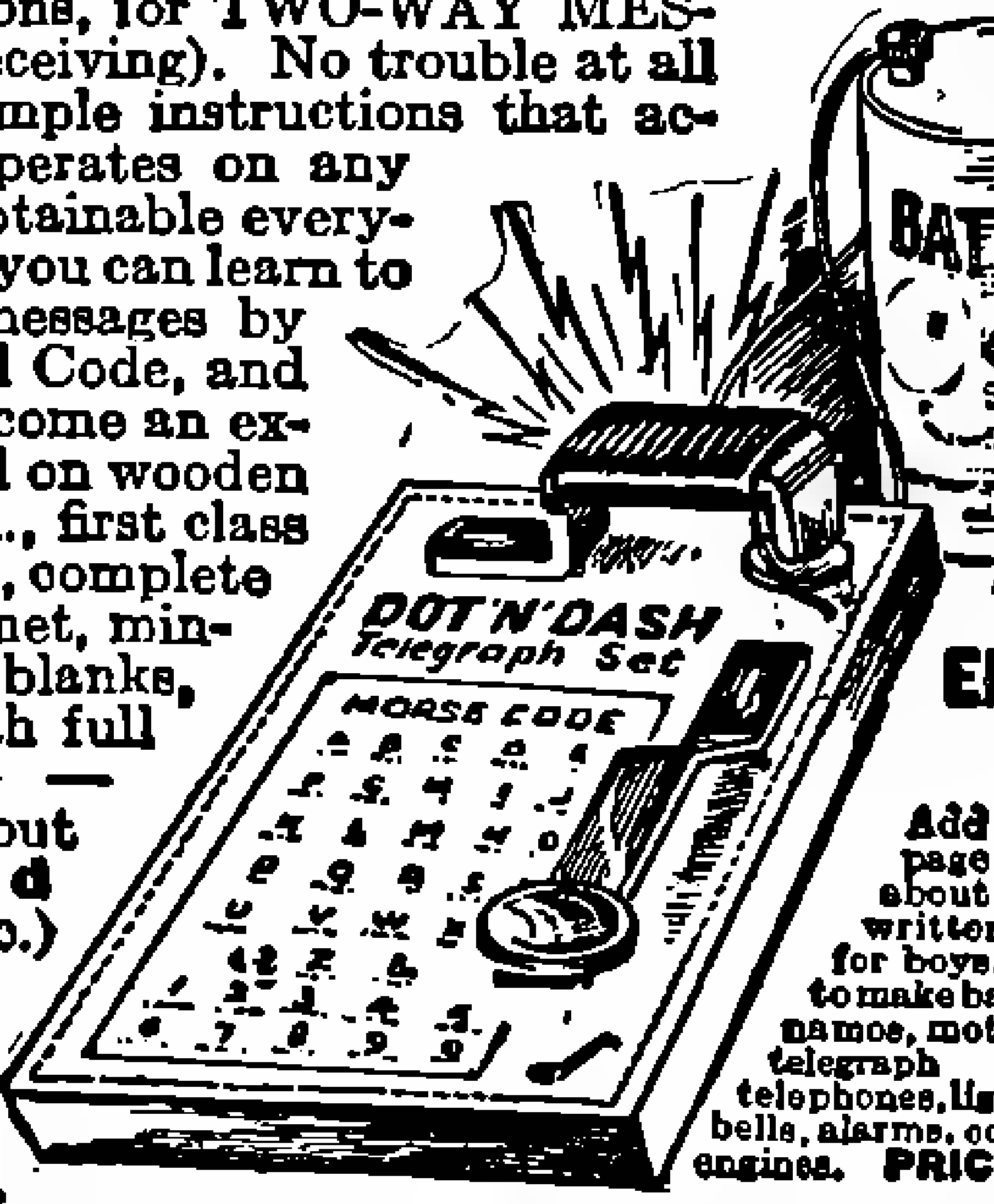
Three new models now out **25c, 50c and $1.00.** Well made and effective. Modelled on pattern of latest type of Revolver. Appearance alone enough to scare a burglar. Takes 22 Cal. Blank Cartridges obtainable everywhere. Great protection against burglars, tramps, dogs. Have it lying around without the danger attached to other revolvers. Fine for 4th July, New Years, for stage work, starting pistol, etc. **SMALL SIZE 4 in. long 25c. MEDIUM SIZE 5 in. long 50c. LARGE SIZE 6in. long $1.00. BLANK CARTRIDGES 50c per 100. HOLSTER (Cowboy type) 50c. Shipped by Express only not prepaid.** *710 page catalog of other pistols, sporting goods, etc. 10c*



Electric Telegraph Set

15c

BOYS! A private Electric Telegraph Set of your own for **15c.** Lots of fun sending messages to your friends. Better still get two sets, hook them up as shown in the directions, for TWO-WAY MESSAGES (sending and receiving). No trouble at all to operate with the simple instructions that accompany each set. Operates on any standard dry battery obtainable everywhere. With this outfit you can learn to transmit and receive messages by the Morse International Code, and in a very short time become an expert operator. Mounted on wooden base measuring 4 x 3 in., first class construction throughout, complete with key, sounder, magnet, miniature Western Union blanks, packed in neat box with full illustrated instructions — **ALL FOR 15c** (without battery) **postpaid** (Canada and Foreign 20c.)

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CHAMELEONS—Shipped by Mail—25c

WATCH IT CHANGE ITS COLOR

LIVE DELIVERY GUARANTEED

Get one of these most wonderful of all creatures. Watch it change its color. Study its habits. Wear one on the lapel of your coat as a curiosity. Watch it shoot out its tongue as it catches flies and insects for food. No trouble to keep. Can go for months without food. Measures about 4 inches in length. Shipped to any address in U. S. A. by mail. We guarantee safe arrival and live delivery. **PRICE 25c, 3 for 50c, POSTPAID.**

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NEW VAMPING CARD

NO TEACHER NEEDED--SURPRISINGLY SIMPLE SYSTEM

Persons having neglected their Musical Education need not despair, for with the aid of our new VAMPING CARD (placing the card upright over the piano keys), you can Vamp away to thousands of Songs, Ballads, Waltzes, Rag Time, etc., etc. No knowledge of music is required. After using it a few times, you will be able to dispense with the aid of the Vamping Card entirely. The price of this very clever invention is only 15c postpaid.

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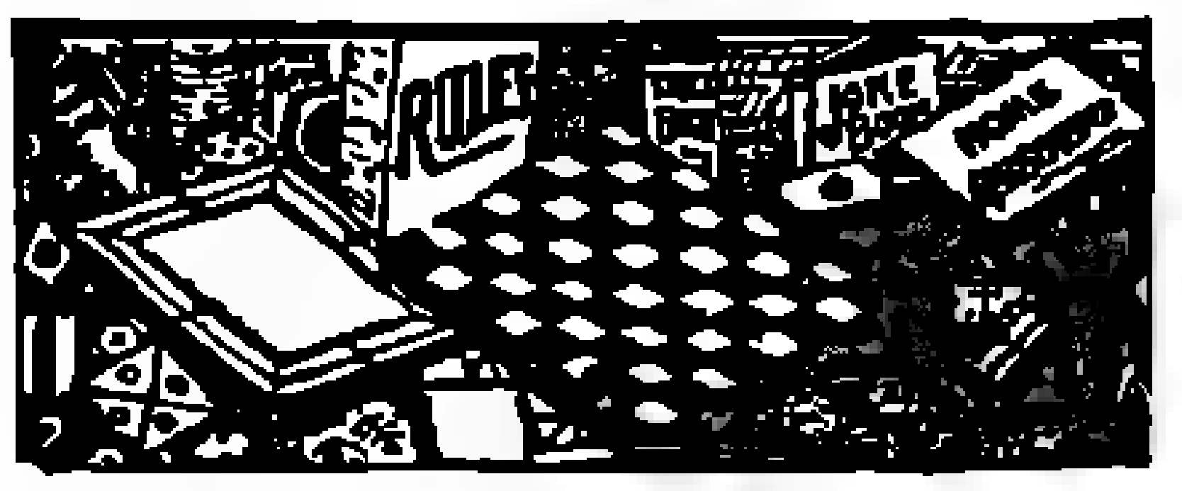

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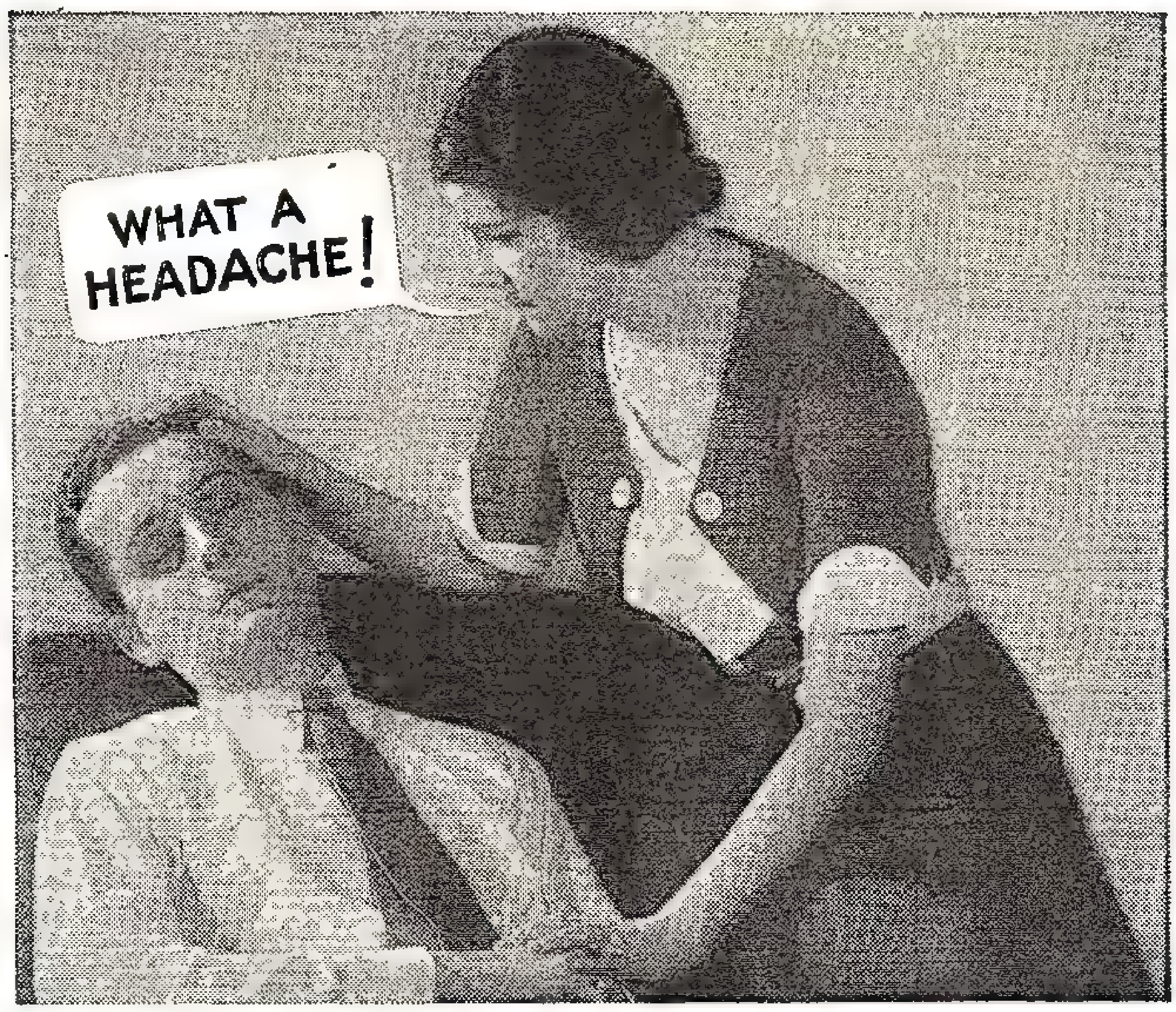
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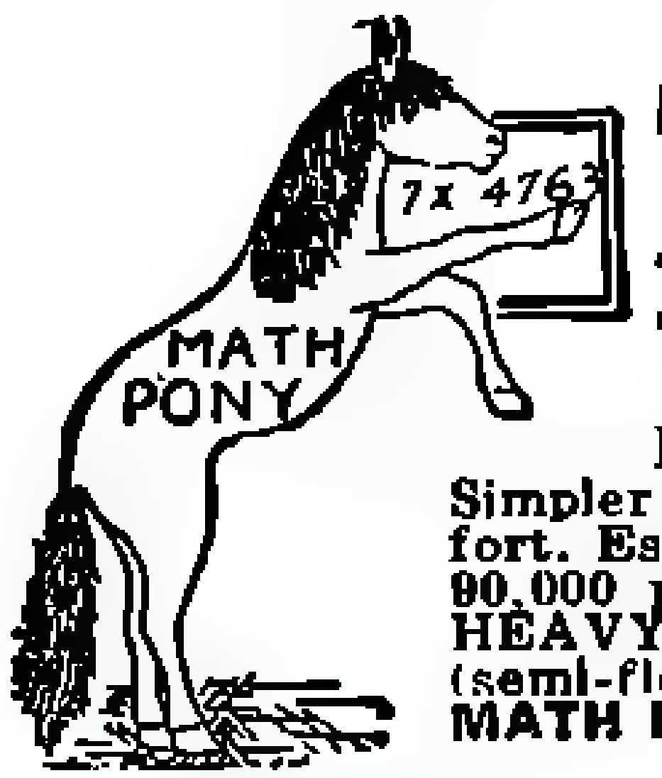

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INVENTORS *and* MECHANICAL MINDED MEN

Can You Answer these Questions?

●

1. What is the only effective way to protect an invention?
2. What is first step in making application for patent?
3. How many patents were issued to Thomas A. Edison?
4. To what president was issued patent for expanding air-chambers to lift river boats over sand bars?
5. How many years does a mechanical patent remain in force?
6. How does the issuance of a patent protect the inventor?
7. Is it compulsory to prepare a working model before making application for patent?
8. What is a "Record of Invention" form?
9. Why does the Patent Office advise applicants to employ registered patent attorneys?
10. When can an article be marked "Patent Applied For"?

● **For the answers to these questions and other information of value to you, look on page 138**

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Exclusive! MY FLIGHT

By Jean Piccard

EVER since the first stratosphere ascension of my brother, Auguste Piccard, I have been asked these questions:

"What about going still higher than the stratosphere? What about going beyond the earth's atmosphere? What do you think of week-end trips to Mars or a sight-seeing flight through the rings of Saturn?"

Eventually I believe it will be possible to circle the earth in two hours at an altitude where there is no air to interfere with one's motions. However, as to interplanetary travel—well, let us begin at the beginning:

It is strange to say, but half an hour from here there is something like an entirely new country. Stratosphere is the name given to it. It is the upper part of the earth's atmosphere, the region of eternal cold. It begins about six miles from the earth's surface, and the air of which it is composed is too rarefied to sustain human life.

So far, men have gone into the upper stratosphere only by means of balloons. No balloon, no matter how great its buoyant power, can go beyond the stratosphere, because a balloon is lifted by the surrounding air.

However, there is another method of locomotion which does not depend upon air—that is the rocket. The rocket supports itself by throwing off the products of combustion. A simple calculation shows that a

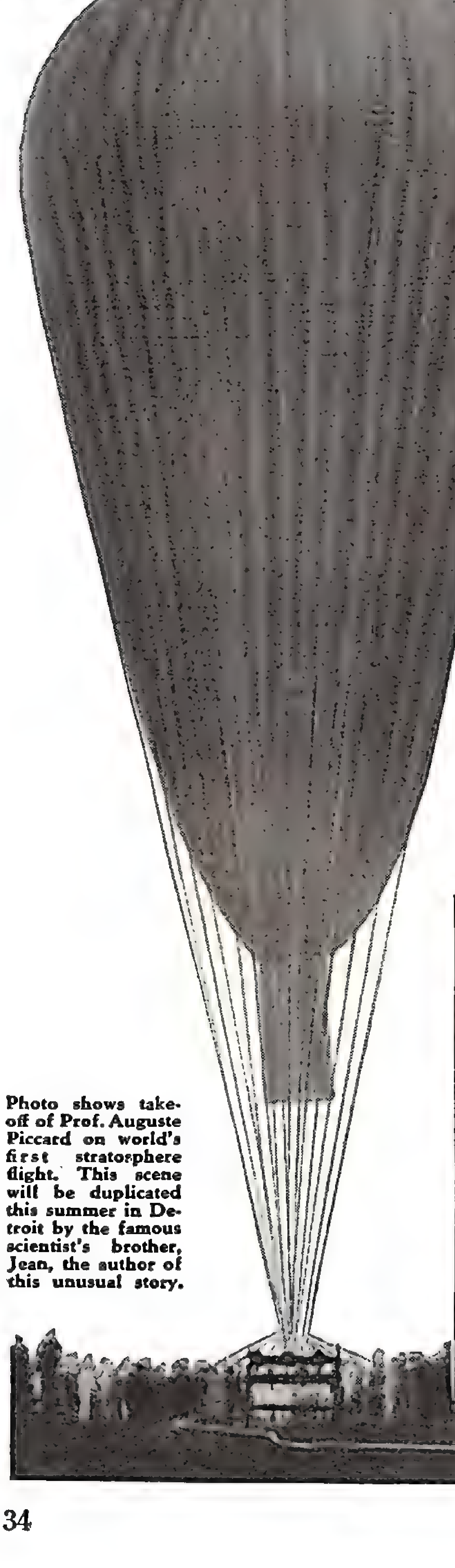
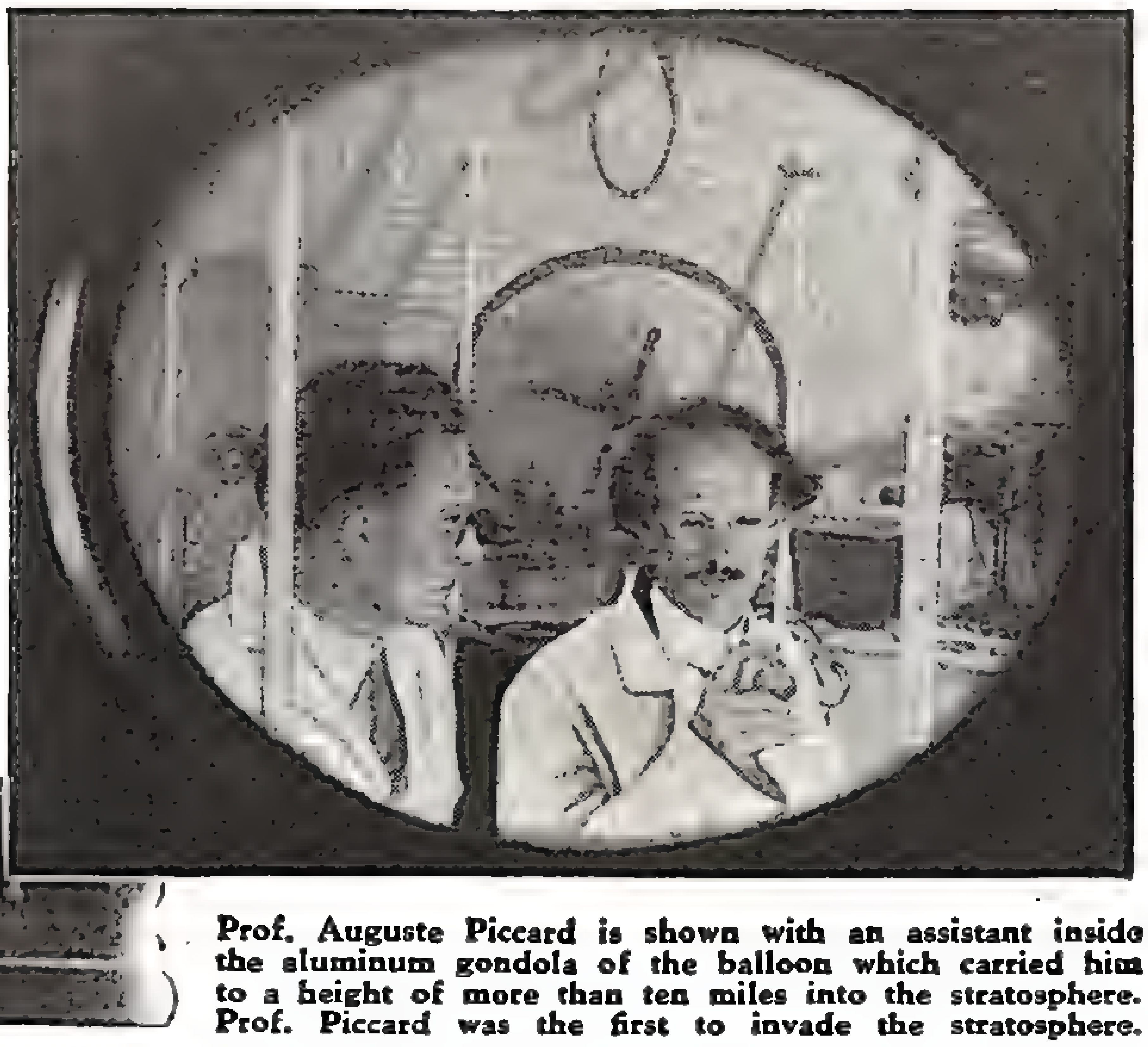


Photo shows take-off of Prof. Auguste Piccard on world's first stratosphere flight. This scene will be duplicated this summer in Detroit by the famous scientist's brother, Jean, the author of this unusual story.



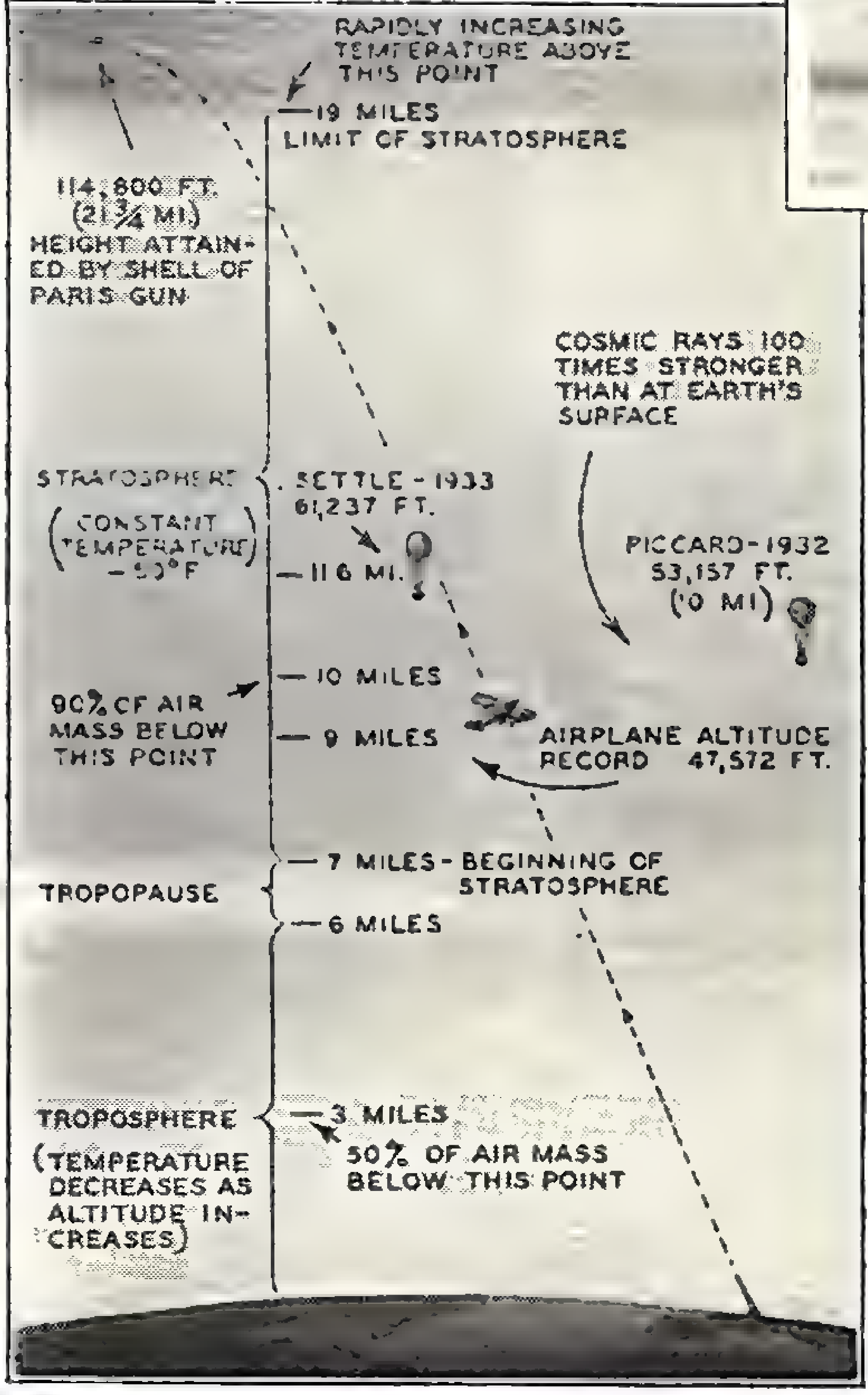
Prof. Auguste Piccard is shown with an assistant inside the aluminum gondola of the balloon which carried him to a height of more than ten miles into the stratosphere. Prof. Piccard was the first to invade the stratosphere.

into the STRATOSPHERE

Interplanetary Flight

BY BREAKING down matter, transforming it into light and utilizing the resultant energy, man may make a round trip to Mercury (57,000,000 miles distant) on about 110 pounds of lead, according to news interviews with Prof. Auguste Piccard.

Explosive fuels for interplanetary travel, however, offer difficulties. Moon-bound projectiles would require an initial velocity of 24,000 m.p.h., fired from a gun barrel almost 2,000 feet long. Moon rockets would need 20 tons of explosive. To avoid a smash on landing, another 20 tons is necessary to brake the rocket.


RAPIDLY INCREASING TEMPERATURE ABOVE THIS POINT
—19 MILES
LIMIT OF STRATOSPHERE
114,800 FT. (21¾ MI.) HEIGHT ATTAINED BY SHELL OF PARIS GUN
COSMIC RAYS 100 TIMES STRONGER THAN AT EARTH'S SURFACE
STRATOSPHERE (CONSTANT TEMPERATURE - 55° F)
SETTLE - 1933 61,237 FT.
—11.6 MI.
PICCARD-1932 53,157 FT. (10 MI)
—10 MILES
90% OF AIR MASS BELOW THIS POINT
—9 MILES
AIRPLANE ALTITUDE RECORD 47,572 FT.
—7 MILES - BEGINNING OF STRATOSPHERE
TROPOPAUSE
—6 MILES
TROPOSPHERE (TEMPERATURE DECREASES AS ALTITUDE INCREASES)
—3 MILES
50% OF AIR MASS BELOW THIS POINT

Man's conquest of space and the hardships he must endure are graphically shown in drawing above. Greatest height reached was that of projectile thrown by the Paris gun. Note how air mass grows less with the increase in height.

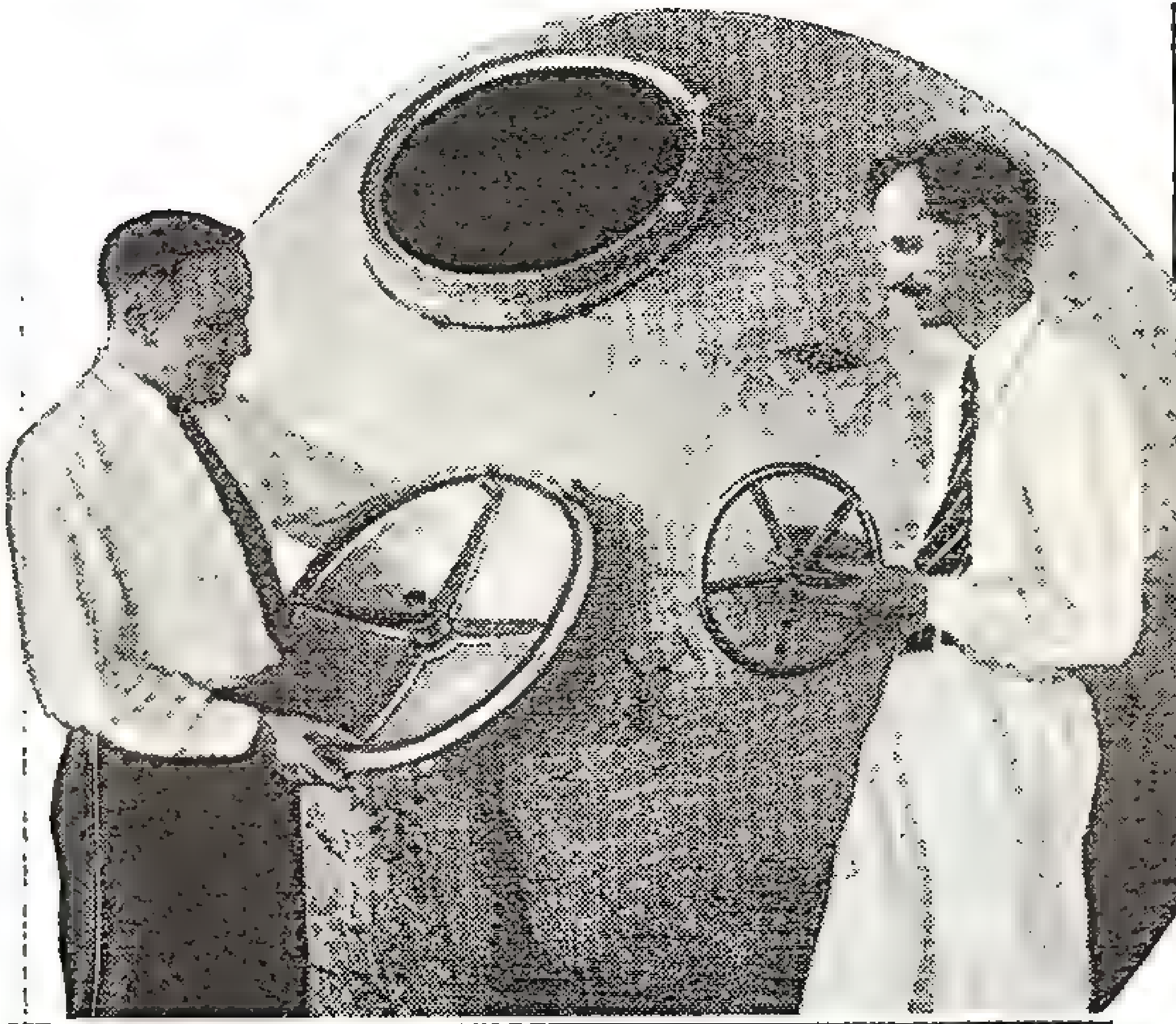
To be the first licensed woman balloonist and first of her sex to enter the stratosphere, Mrs. Jeannette Piccard, wife of the author, is taking balloon lessons, preparatory to piloting her husband into space. Above, left to right, Mrs. Piccard, Professor Piccard and the instructor, Edward J. Hill, noted Detroit balloonist, on a recent trial flight.

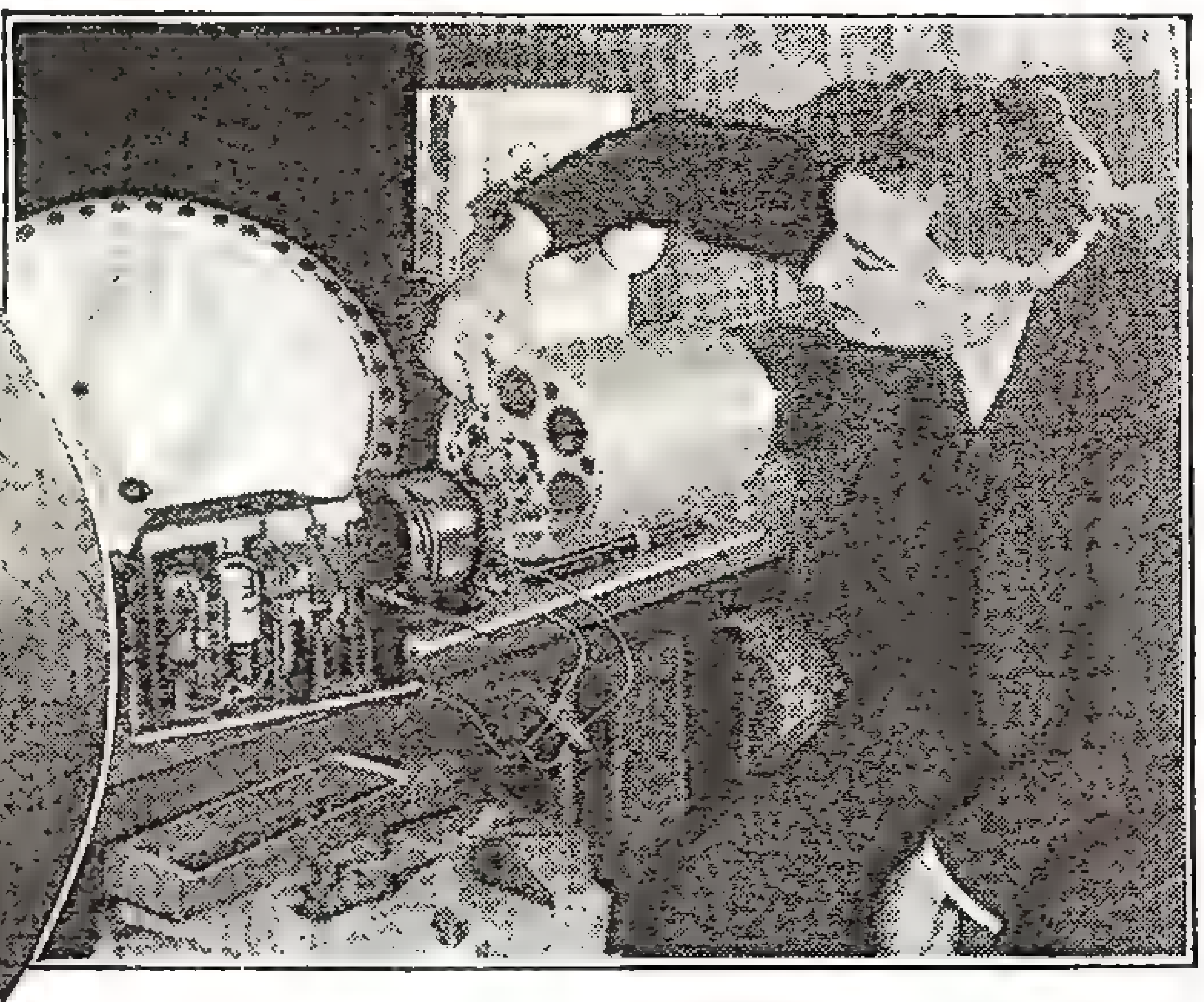
rocket can easily contain enough energy to go beyond the stratosphere, say 100 or 1,000 miles from the surface of the earth. The calculation also shows that from a purely energetic point of view, a rocket might contain enough fuel to leave the neighborhood of the earth altogether, and visit our most distant sister-planets.

Such a flight to another planet would be theoretically possible but exceedingly difficult. And a return flight would probably be impossible. In the present state of our knowledge, it is useless even to discuss interplanetary travel as a practical thing. New sources of energy will first have to be tapped—sources related to the vast energy given off by radium and other radio-active substances.

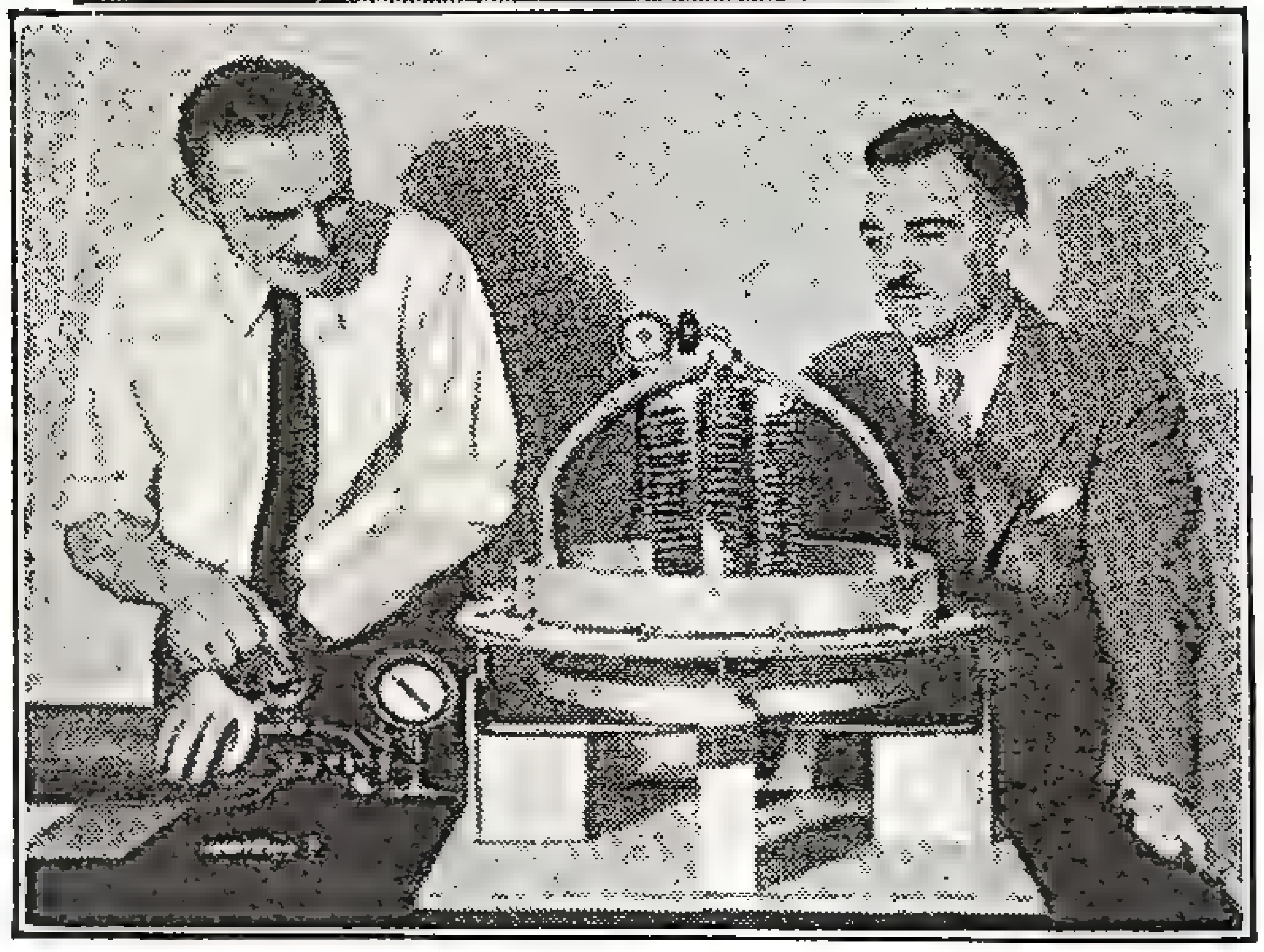
Physicists have just begun, less than a year ago, to create artificially, minute amounts of radio-active substances. If one could produce large amounts of these substances—say, put them on the market in lots of half an ounce—then it would be time to talk about interplanetary travel. It is

Daring Men Probe Stratosphere Mysteries in a Series of Record Flights





Left, Commander Settle and Prof. Jean Piccard examine the gondola in which they were to make a flight last year. The flight was canceled but the gondola will be used on Prof. Piccard's newest venture. Right, Dr. W. F. G. Swan, of the Franklin Institute, Swarthmore, Pa., checks over the cosmic ray apparatus to be used by Prof. Piccard.



Captain Albert W. Stevens, left, and Major William E. Kepner test a safety compression valve in preparation for the Army-National Geographic stratosphere flight.

not likely that any of us, even the child born today, will still be alive when some "Lone Eagle" of the future will come back with a close-up photograph of the canals of Mars.

The rocket is now at about the point where the automobile was when it was discovered that a mixture of air and gasoline explodes with liberation of great energy. We know the power which will eventually send passenger rockets above the stratosphere, but we have yet to build the rocket. We have yet to invent the right kind of "carburetor," the right kind of "steering wheel," the proper "differential," and all the various parts of a practical machine.

In other words, the possibility of rocket flying is still remote. But investigation of the stratosphere, itself, presents enough problems to keep us occupied for a long time, without going beyond the earth's envelope of air.

One of the more conservative questions asked me is the possibility of airplanes flying through the stratosphere. Will it ever be practicable? Certainly, it will. As a matter of fact, it is entirely possible now. Some pilots have already taken airplanes into the lower levels of the stratosphere. But their airplanes were not equipped with airtight cabins like the gondola of a stratosphere balloon. To fly in the stratosphere, even in its lower levels, without an airtight cabin means a terrific strain on the pilot, a strain which easily spells death.

But the airtight cabin invented by my brother, Auguste, when adapted to the airplane will make stratosphere flying as easy

(Continued on page 128)

1934 Stratosphere Flights

KEPNER-STEVENS—Major William E. Kepner and Captain Albert W. Stevens seek 15-mile record in a flight sponsored jointly by the Army Air Corps and the National Geographic Society. Take-off in Black Hills, near Rapid City, S. D.

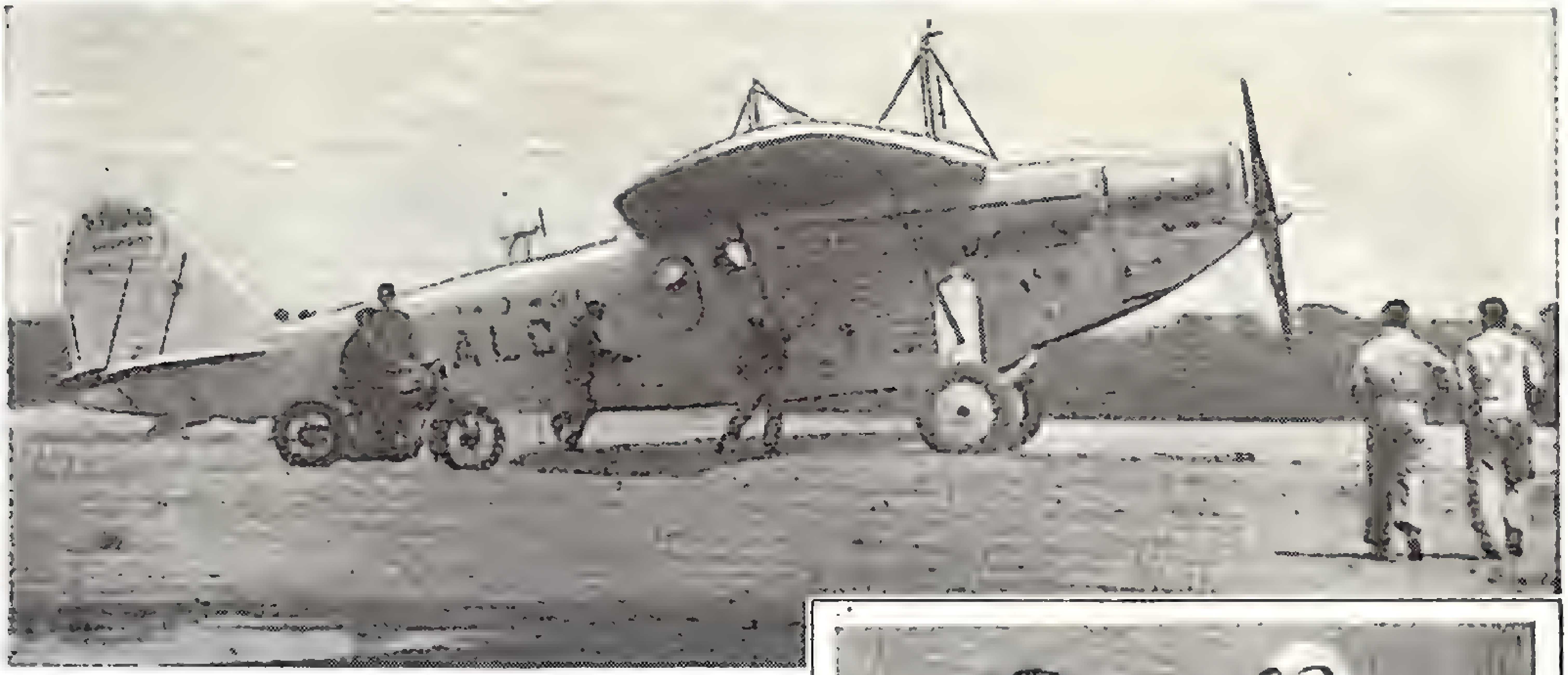
WILEY POST—Plans 55,000-ft. climb in his globe-circling monoplane, "Winnie Mae," newly equipped with special supercharger and extreme variable-pitch propeller. Since pressure at sea level is 15 lbs. per square inch inside and outside body but only 3 lbs. outside at 40,000 ft., Post uses a special rubberized suit which presses down on body, equalizing the thinning pressure.

PICCARD—Prof. Jean Piccard and wife, Jeanette, plan flight from Detroit, described in this article.

SOVIET RUSSIA—The "flying armchair," in which a pilot dressed in deep-sea diver's suit and breathing compressed air, will ascend, seated in a tiny, open cage surrounded by instruments. Plan is to cut balloon loose and descend in parachute.

PARIS-NEW YORK PLANE—A stratosphere airplane under construction which will make the hop, Paris to New York, in eight hours.

French Airmen Span Atlantic to Inaugurate 1934 Season



Scene at Floyd Bennett field, New York, as monoplane Joseph Le Brix came to stop after 38½ hour crossing from Paris. Weakened wing guy wires caused premature landing.

CAPTAIN MAURICE ROSSI and Lieutenant Paul Codos, holders of the long distance flight record, were the first to cross the Atlantic in both directions when they completed a flight from Paris to New York recently. They had planned a nonstop flight to San Diego, but wing trouble forced the landing in New York.

Other New Air Records

The S-42, largest flying boat built in this country, climbed 21,800 ft., a record for altitude with a pay load.

Jack Frye, veteran airmail pilot, recently zoomed across the continent in 11 hours, 31 minutes for a new cargo plane flight record.

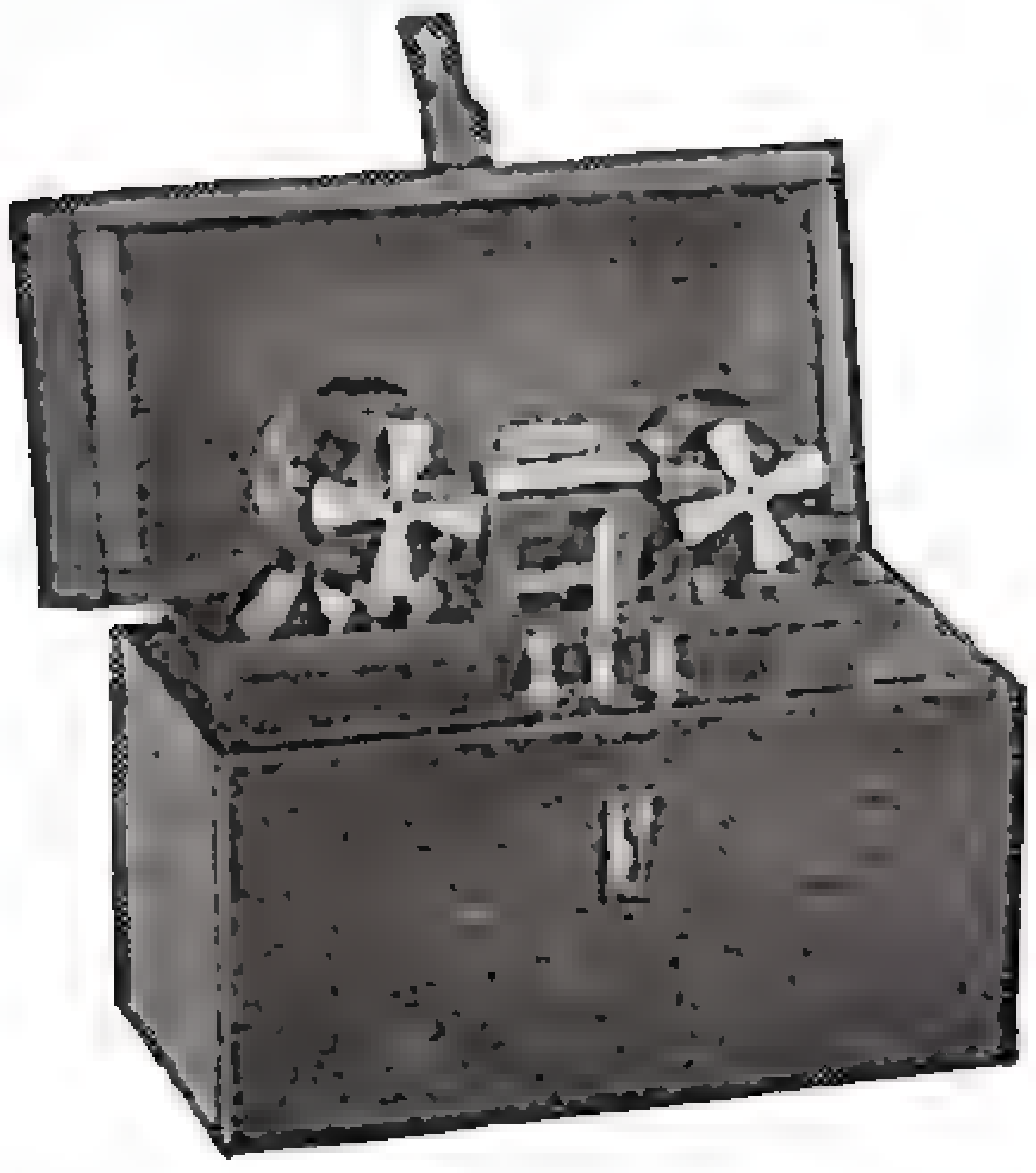
Jean Batten, New Zealand girl flier, soloed from England to Australia in 15 days for a new women's distance record.

Captain Maurice Rossi (left) and Lieutenant Paul Codos, French air aces, first to cross Atlantic in both directions.

Tiny Motors Made From Iron Pipe

THE building of tiny electric motors from odds and ends of wire and iron pipe is the unusual hobby of W. S. Yikes, a Minneapolis M-M reader.

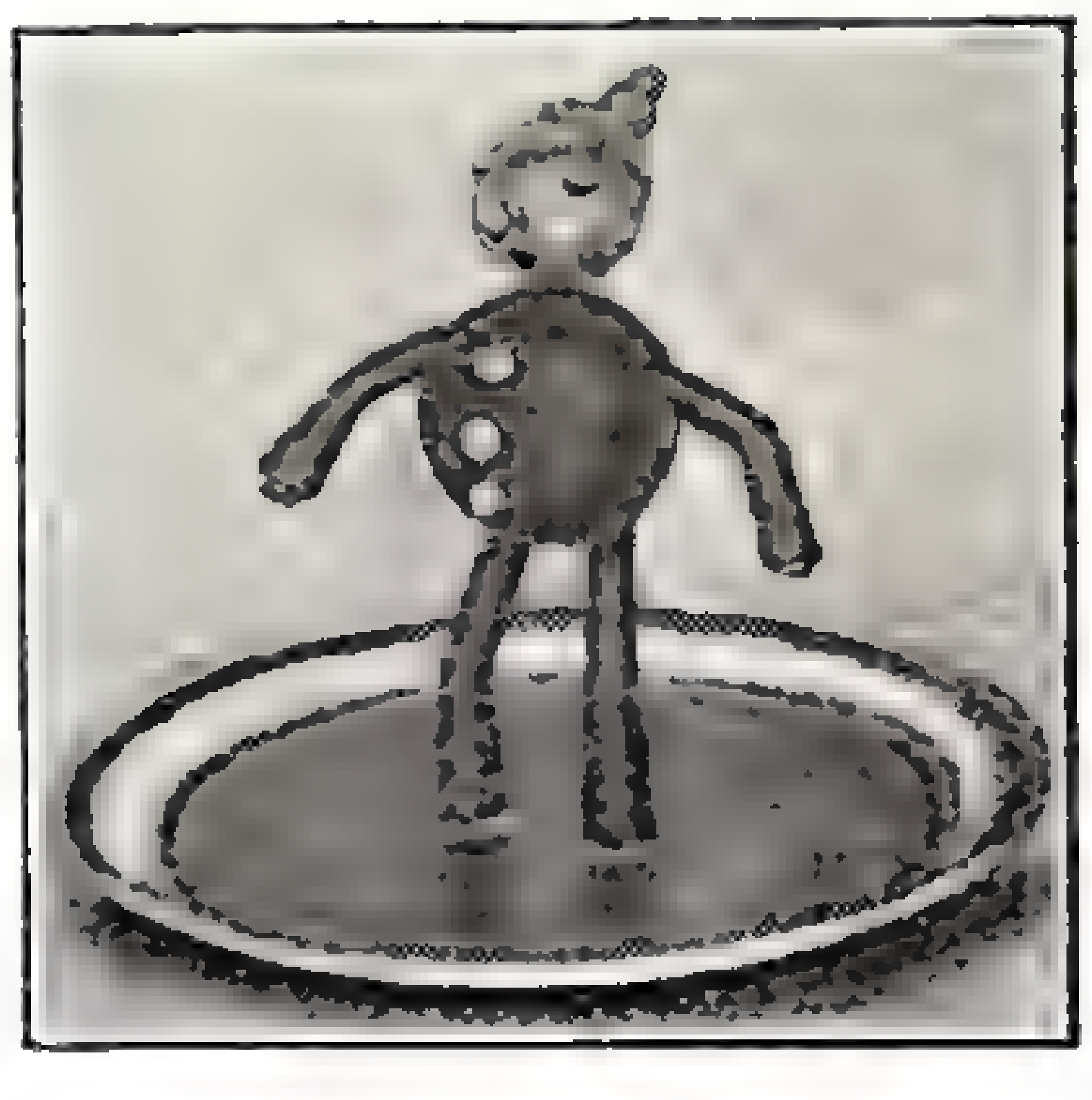
Although only flashlight cells are used for power, the midget motors develop a surprisingly high speed. Pipe lengths of various diameters are used for the field frames. Motors and cells are mounted neatly in a hinged box. A double throw switch controls motors.



Tiny motors made of scrap parts drive fans, midget power saw.

Ash Tray Man Blows Out Cigarettes

TOUCH a lighted cigarette to the mouth of this grotesque little ash tray man, and he will instantly extinguish it with one drop of water. The man must occasionally be filled with water. The head comes off for refilling.



Grotesque figure blows water bubble, extinguishing cigarette held up to its mouth.

Electrically Driven Bellows Keeps Man Alive Two Years

WAGING a grim battle against nature with a human life at stake, scientists in London, England, have been successful in preserving the vital spark in a man doomed to death more than two years ago.

A remarkable mechanical device which was especially invented for his use has kept the Englishman alive through the agency of prolonged artificial respiration.

Electrically driven, the apparatus conveys, through a wide band encircling the patient's chest, a rising and falling movement which simulates normal breathing.

One of the triumphs of modern medicine, the life-saving machine was invented, after considerable experimentation, by Sir William Braggs and developed into its present successful state by R. W. Paul.

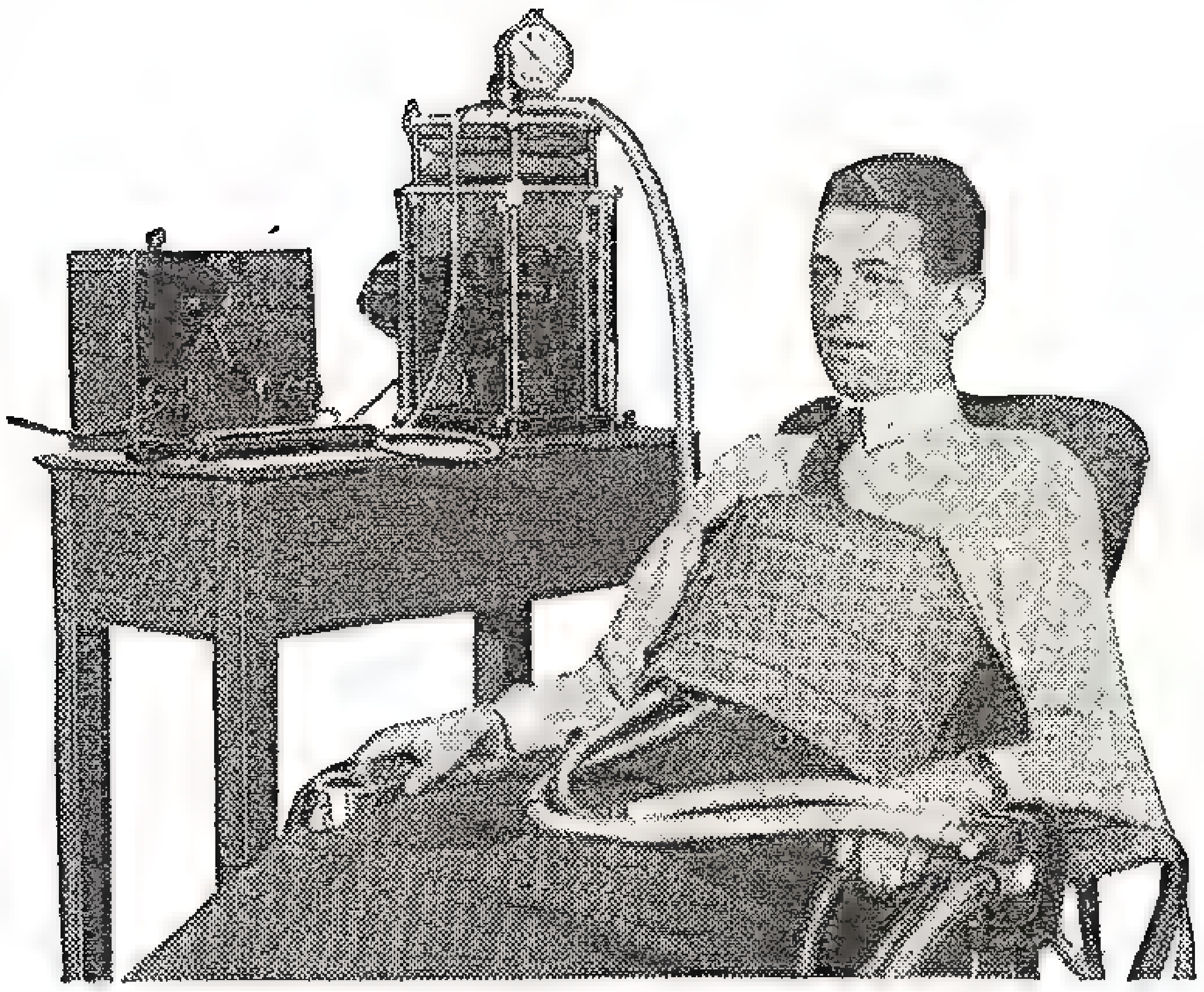
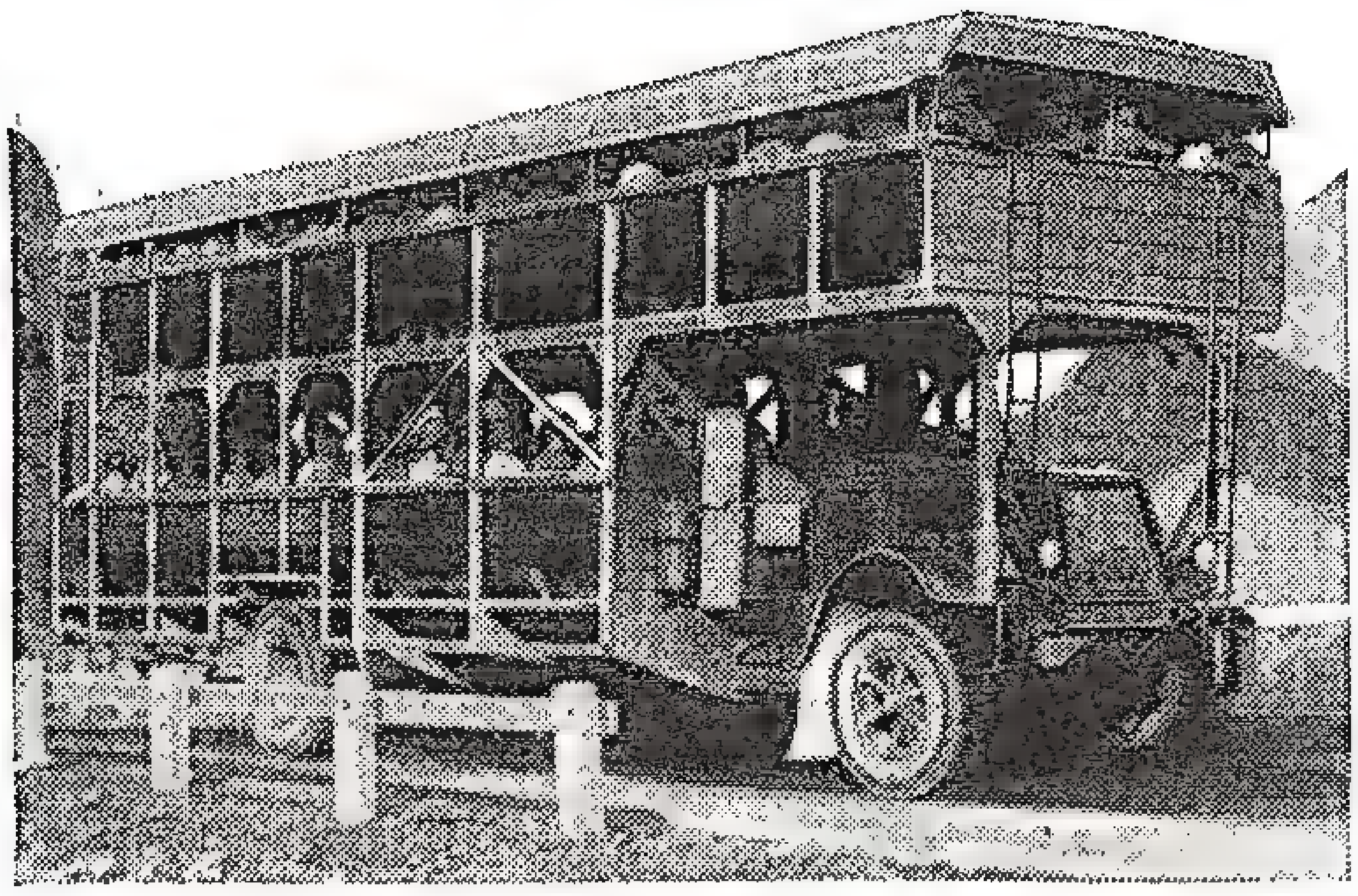


Photo shows man wearing the apparatus invented by English scientists which has kept him alive for more than two years. Artificial respiration is supplied by the machine.

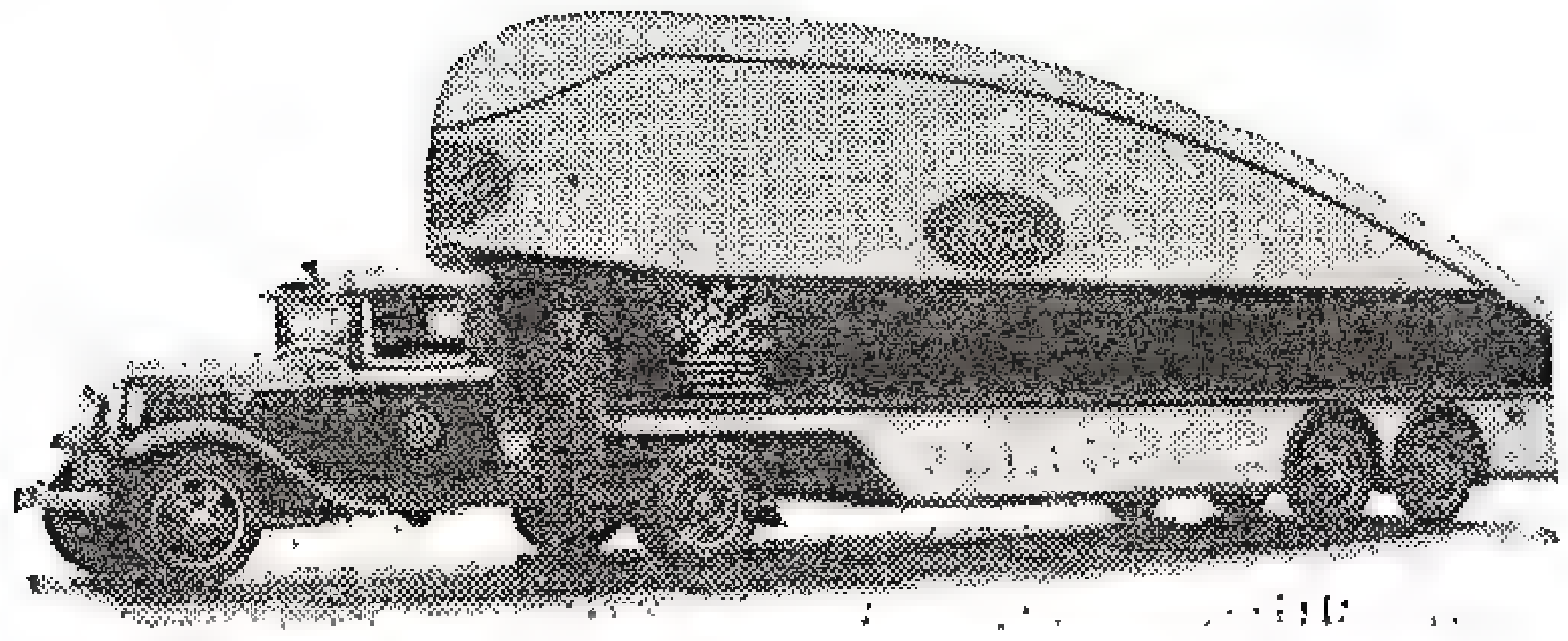


Said to be the world's largest passenger-carrying bus, this huge machine transports 150 workmen on each trip between Boulder City and the site of the Boulder Dam.

Trailer Truck Delivers New Cars

A NEW fleet of haulaway trailer-trucks has recently been put into commission by the Ford Motor Company. Completely enclosed, the trailers are designed to eliminate possible damage to new cars, formerly delivered under their own power.

The trailers are constructed of dowmetal, a magnesium alloy which is lighter in weight than aluminum yet as strong as steel. Although the trailer is completely enclosed against the weather and is twelve feet high and forty feet over all, its total weight is said to be only 4900 pounds. This lightness permits truck speeds of fifty miles an hour, thus ensuring rapid delivery.

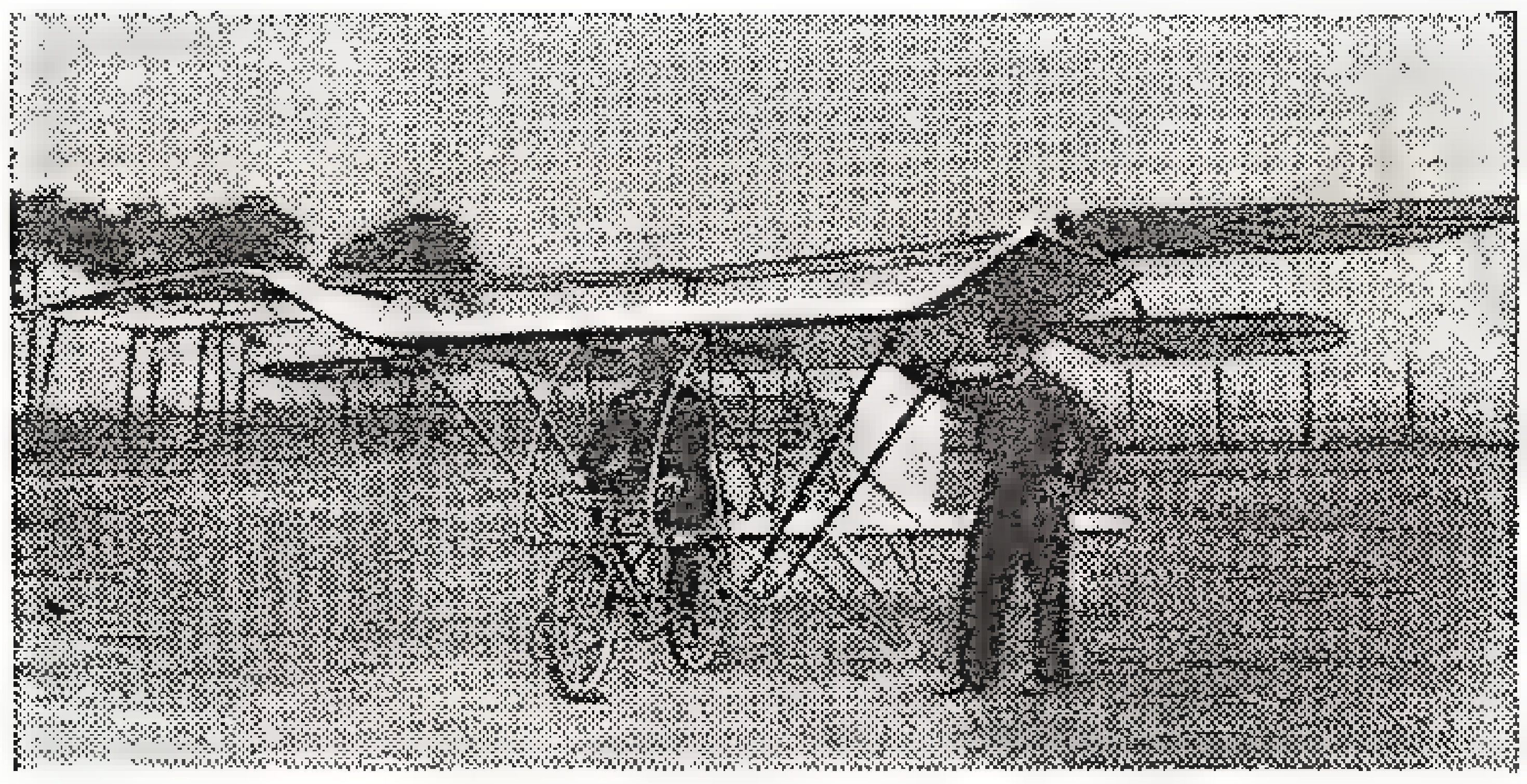


Designed to safeguard new automobiles in transit, this special haulaway trailer delivers cars in the same condition as when they left the assembly line in the automobile factory.

Huge Bus Carries 150 Passengers

FACED with the problem of transporting the army of workers employed on the Boulder Dam project to and from their daily tasks, engineers constructed the largest passenger-carrying bus in the world shown in the photo at left. A double-decker, the vehicle carries 150 workmen on each trip between the dam site and their living quarters in Boulder City.

German Invents "Flying Bicycle"



Built by a German flying fan, this motorless plane depends upon an ordinary bicycle to furnish power for the takeoff. Total weight of the plane is less than two hundred pounds.

THE latest development of foreign aviation enthusiasts is a "flying bicycle" built by a retired police sergeant at Adlershof, Germany.

The machine, which is in reality a bicycle-powered glider, has a wing spread of about 26 feet and a total weight of about 90 pounds. The struts and braces are built of Canadian fir, with an ordinary bicycle serving as the plane's undercarriage.

A system of levers permits the bicycle-pilot to guide the strange craft in flight, and an elaborate set of rounded braces serves as a landing gear.

Boat Building CLUB *Gets* CHARTER *in* SOCIETY *of Mechanix and Inventors*

The HI-N-DRI Yacht Club, of Los Angeles, is Charter Club No. 12 in the International Society of Modern Mechanix and Inventors. Some of the members are shown above. Others were cruising at the time photo was taken.

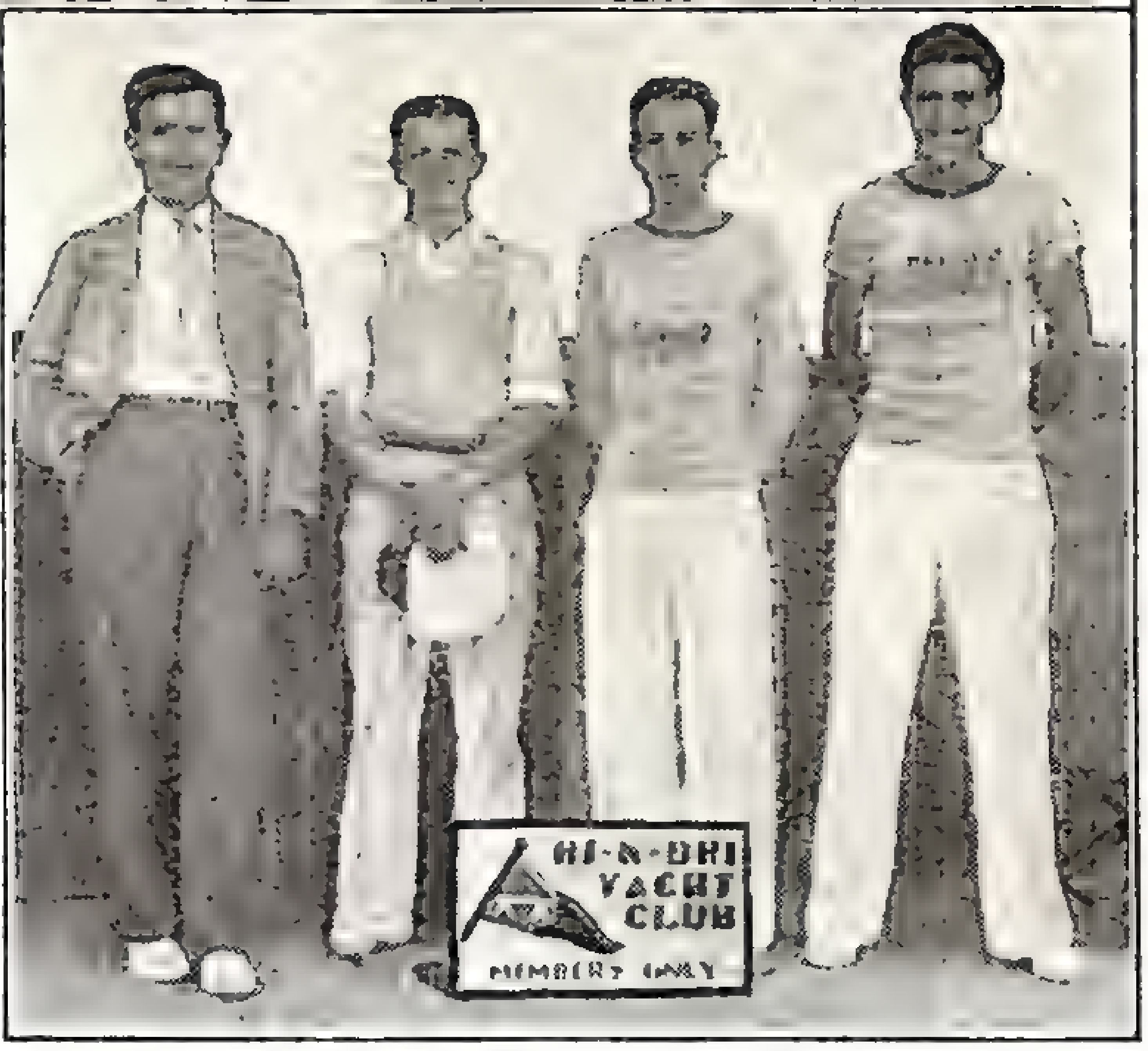
THE HI-N-DRI Yacht Club of Los Angeles is the largest club to receive a charter thus far in the International Society of Modern Mechanix and Inventors. The club was granted Charter No. 12. It has more than fifty members who are chiefly interested in boat building.

Sixty-two clubs have been organized and have applied for charters since the organization of the International Society of Modern Mechanix and Inventors.

At this writing clubs have been formed or are being organized in 23 states in the United States and in three provinces in Canada.

The HI-N-DRI Yacht Club has a very significant and original burgee which is used on all its boats and on its stationery. A letter received from David S. Forsyth, Commodore, says in part:

> **The club was founded to promote and assist in the building of boats, which explains the saw-horse on the burgee. Eighteen of our present fleet were constructed or rebuilt by the owners and their crews. Of this number six are Modern Mechanix designs. Four boats are under construction at present and a 37-foot cruiser is being rebuilt by our Rear Commodore.**
>
> **The two copies of "How to Build Twenty Boats" in the club library are out more than in. The members have found the construction details helpful on other boat problems.**



Flag officers of the HI-N-DRI Yacht Club (shown above) are, left to right: Rear Commodore Leo V. Thomas, Commodore David Forsyth, Vice-Commodore Russell Forsyth, and Fleet Captain J. Robert Donley. Note novel insignia.

As stated in the June and July issues of MODERN MECHANIX AND INVENTIONS anyone interested in the many activities in the fields of science, mechanics, inventions, or the workshop can organize a club and apply for a charter from the International Society of Modern Mechanix and Inventors. The Society does not levy dues, but membership is limited to subscribers to MODERN MECHANIX AND INVENTIONS, the official magazine of the Society.

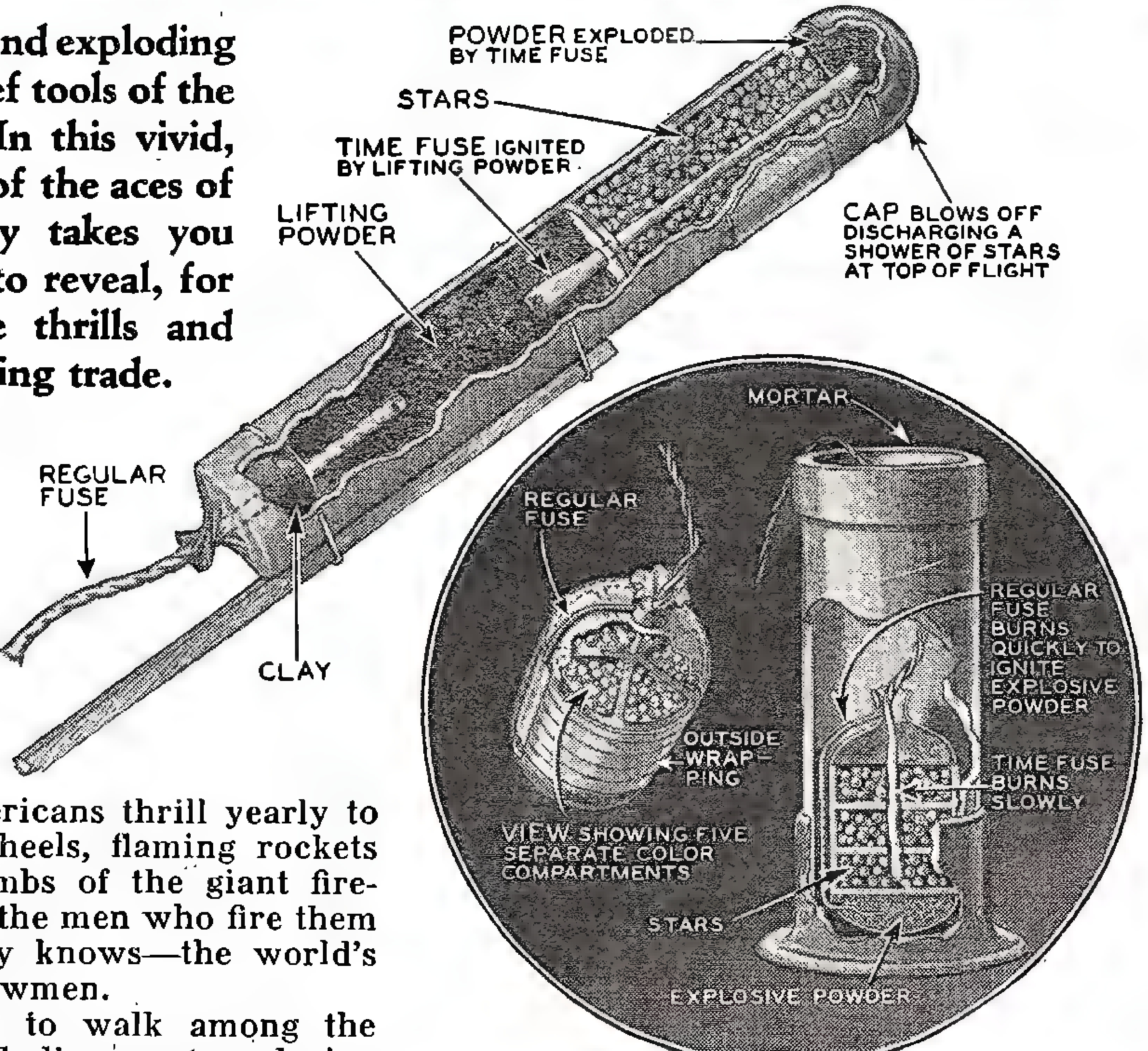
Members of the Society can subscribe to the official mazagine and obtain workshop blueprints at a discount. Requests for application blanks should be sent to the International Society of Modern Mechanix and Inventors, care of MODERN MECHANIX AND INVENTIONS, 529 South Seventh Street, Minneapolis, Minnesota.

HOW A Fireworks Magician

Flaming dynamite and exploding mortars are the chief tools of the fireworks expert. In this vivid, intimate story one of the aces of the fireworks army takes you behind the scenes to reveal, for the first time, the thrills and dangers of his roaring trade.

by

PAUL PADDOCK


POWDER EXPLODED BY TIME FUSE
STARS
TIME FUSE IGNITED BY LIFTING POWDER
LIFTING POWDER
CAP BLOWS OFF DISCHARGING A SHOWER OF STARS AT TOP OF FLIGHT
REGULAR FUSE
CLAY
MORTAR
REGULAR FUSE
REGULAR FUSE BURNS QUICKLY TO IGNITE EXPLOSIVE POWDER
OUTSIDE WRAPPING
TIME FUSE BURNS SLOWLY
VIEW SHOWING FIVE SEPARATE COLOR COMPARTMENTS
STARS
EXPLOSIVE POWDER

Top drawing shows cross section of giant rocket that discharges star showers. Below is mortar and bomb which is divided into sections holding the different colored stars.

MILLIONS of Americans thrill yearly to the glittering wheels, flaming rockets and spectacular bombs of the giant fireworks displays; but the men who fire them are the men nobody knows—the world's most mysterious showmen.

How does it feel to walk among the flaming sets and exploding mortars during a big display? What are the real dangers of this roaring trade? What is the strange, unexplainable lure of a profession that requires toying with tons of explosives to give the crowds a flaming thrill?

Art Briese, for nineteen years an expert pyrotechnician for Thearle-Duffield, recently revealed the mysteries of his calling to an investigator for MODERN MECHANIX AND INVENTIONS. Briese has personally blown millions of dollars worth of fireworks into blazing ruins; he's touched off enough powder and dynamite to blow Pike's Peak into fragments; and he's come through his exacting job with injuries no more serious than scorched hands and a current enthusiasm for his work that's as keen as the day he got his first stick of dynamite to bore.

"One of the important things to keep in mind about fireworks," said Briese, "is the difference between display work and the over-the-counter business—that is, the sale of firecrackers, pin wheels, rockets and the like to the consumer. Accidents are far less frequent in display work because trained men do the firing.

"The noise-makers are the most dangerous pieces. In fact, a stick of dynamite is about the most hazardous unit we employ.

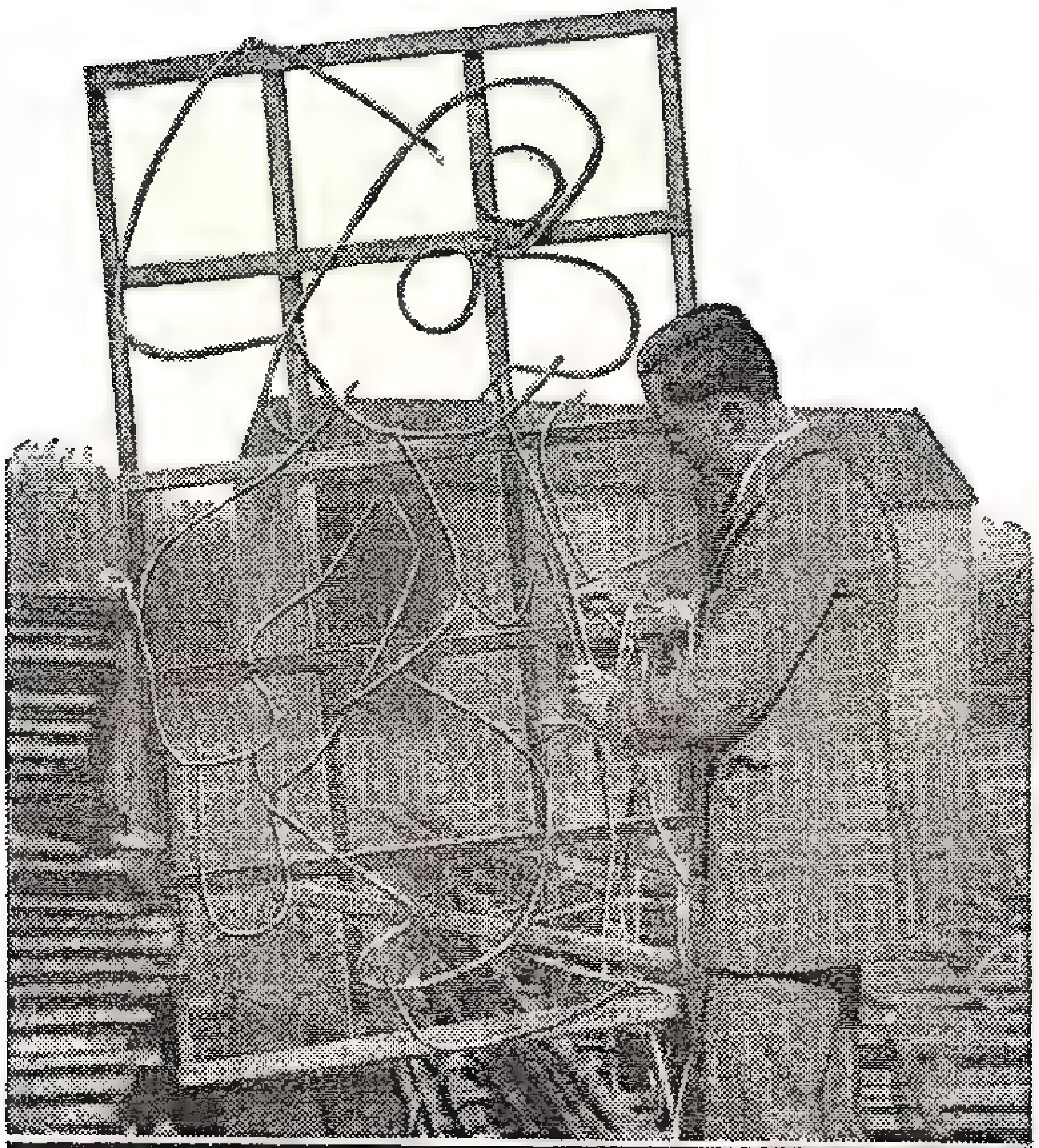
Tames Dynamite

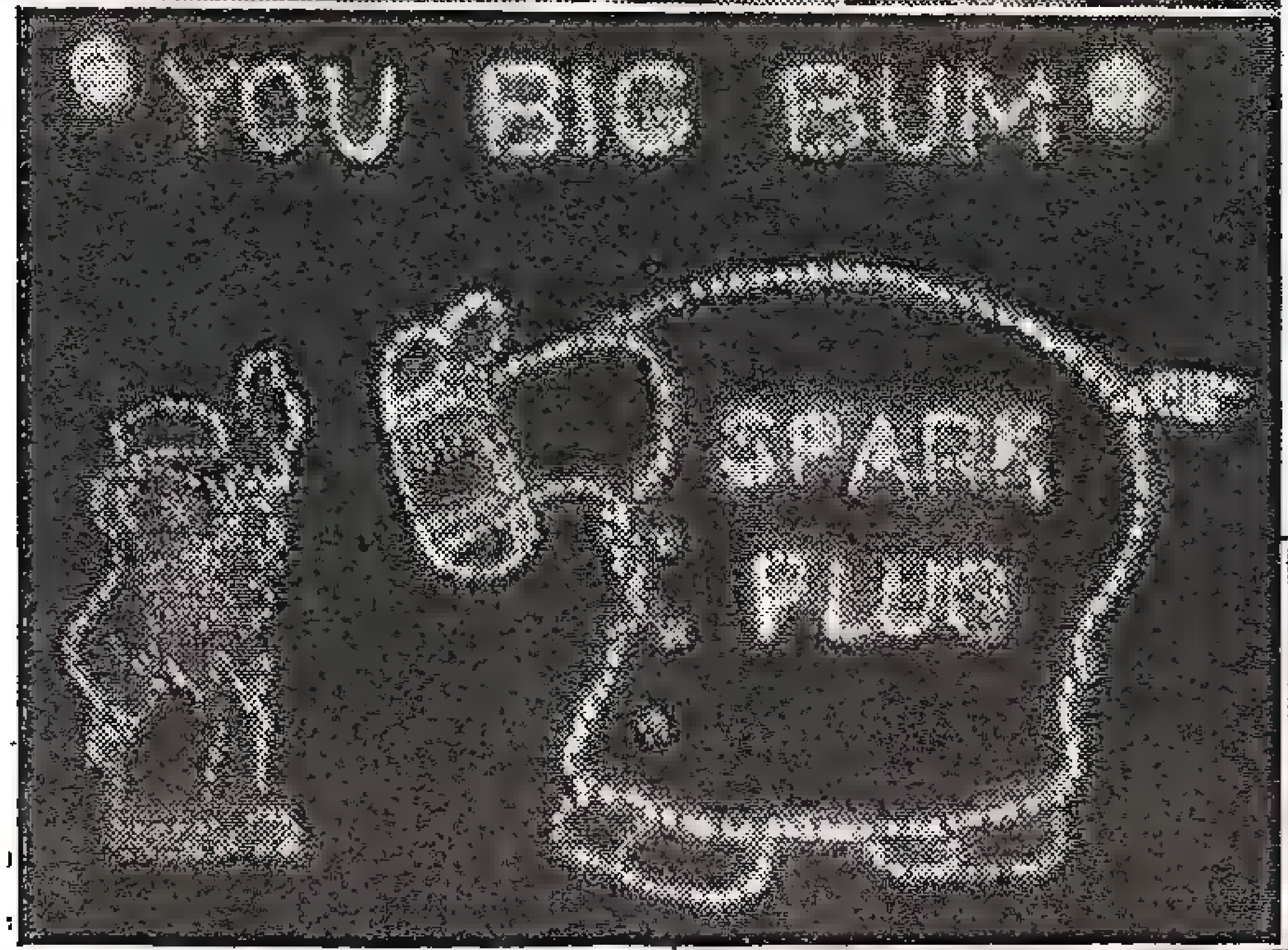
Of course, when this is handled properly, it's safe.

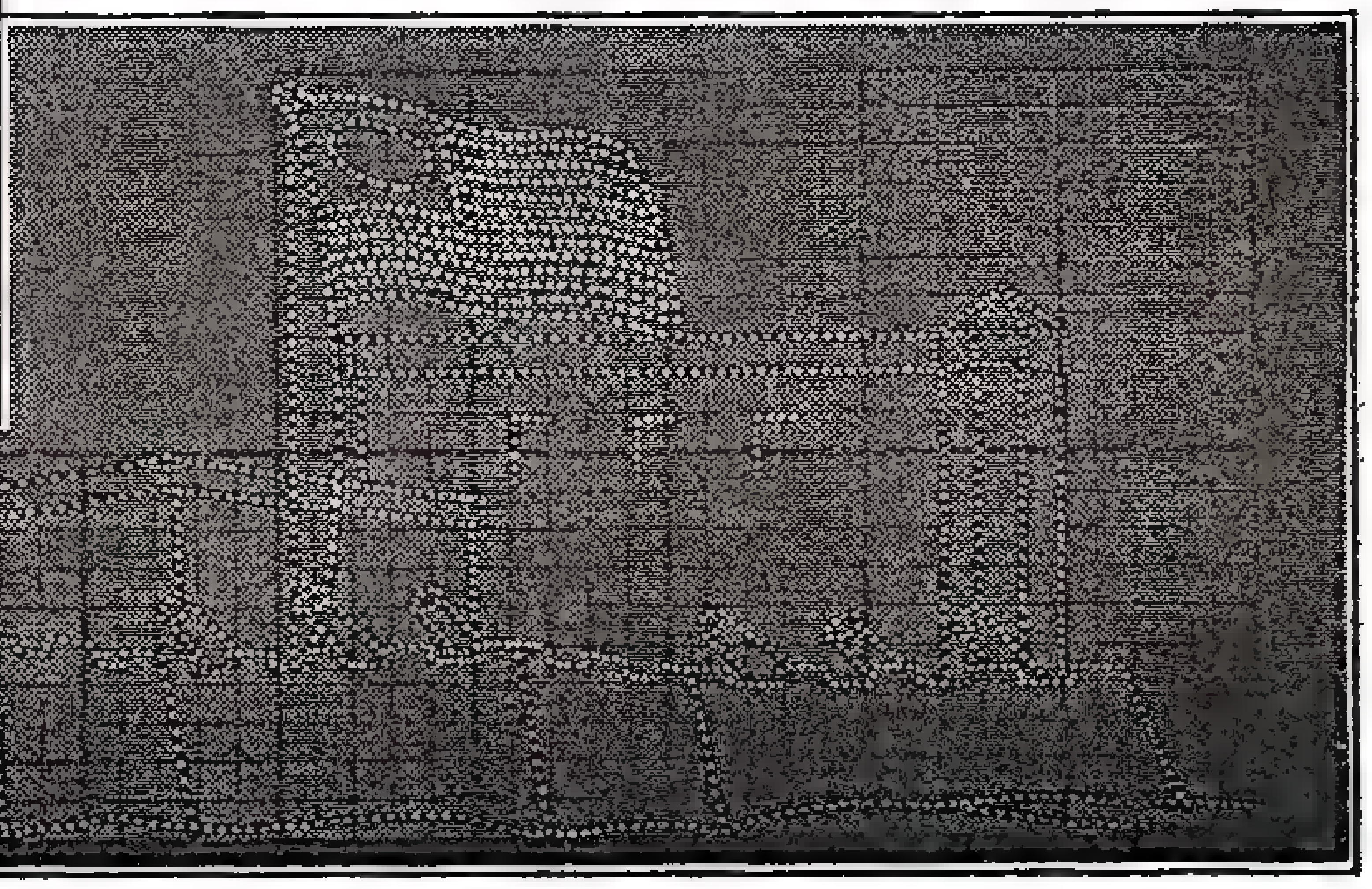
"We don't use much dynamite in the average show. At the Century of Progress, for instance, it is forbidden because the shock would be harmful to fish in the Shedd Aquarium. In shows where dynamite is used the sticks are fired electrically. They are suspended a few feet above the ground and carefully isolated to prevent damage. These shots and the big bombs we call 'ballyhoo.' The bombs are fired from mortars, steel cylinders buried up to their necks in the ground. Workers are protected by a barricade consisting of a 12″ x 12″ timber or a telephone pole to prevent danger in case a bomb is detonated in the mortar. The firing fuse lies out over the barricade where it can be ignited easily without getting too near the mortar. This fuse ignites a charge of powder at the base of the bomb, literally pushing it into the air. The explosion comes when a time fuse, already ignited, reaches the powder charge.

Guarding Against Accidents

"The worst accidents in the fireworks business occur at the factories but they are rare now. Only small quantities of material are handled at a time and most of the work is done in isolated sheds, spotted over a wide area. These sheds are of flimsy construction. If an explosion does occur, the







Top photo shows workman fashioning rattan outline of Barney Google for fireworks set piece above. At right is artist's drawing of Fort McHenry which workmen follow in placing rattan and fire lances on 5x10 foot frames covering 1000 square feet.

Water fireworks are a new development. They are produced by tiny rocket cars that speed 600 m.p.h. over the water.

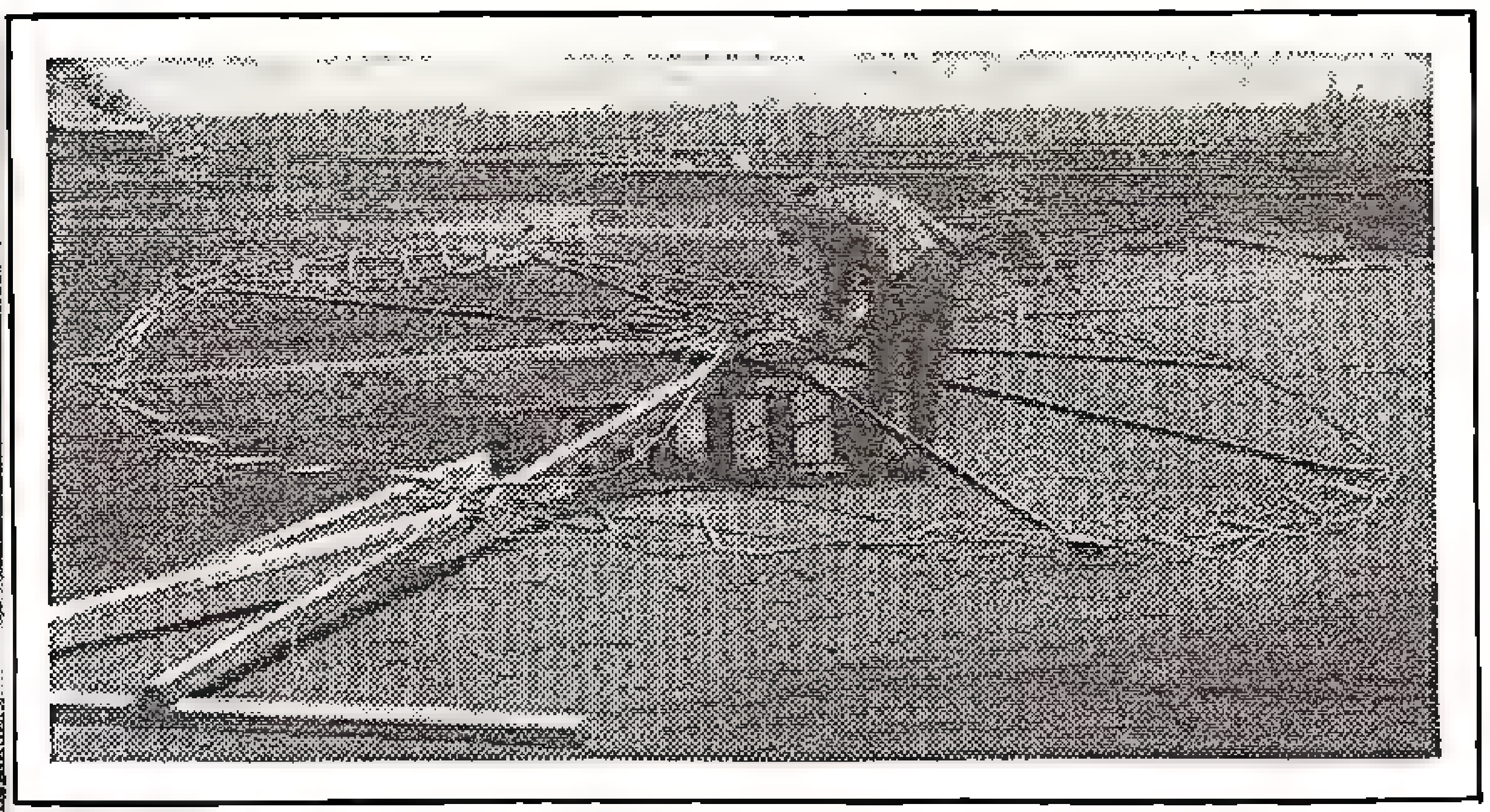


Photo above shows huge pinwheel under construction. The fire lances are connected with fast burning fuse.

These workmen are putting the frames together for a set. The two in center are attaching rattan holding fire lances.

walls and roof give way, reducing the shock to any persons inside. The big display sets with all their sparks and fire may look hazardous but they are not as dangerous as the simple sticks of dynamite and the bombs. A big display may contain a ton of material but only 300 or 400 pounds of this may be explosive powder. Chemicals make up the balance of the material; and whereas they'll burn, of course, they won't explode violently.

How Displays Are Fired

"Shooters wear no special safety equipment, not even goggles. The firing is done with a 'port fire' a five-foot flare made of two rocket sticks spliced together. It burns about five minutes and gives plenty of brilliant light so the operator can see the 'match,' or fuse, where the piece is set off. Sometimes part of the set doesn't go off because of a broken connection. We keep watch for this and reach up with a port fire and start it going. Any part of the set can be fired as long as the fuse can be reached. This burns rapidly. In a few seconds, it ignites the entire piece, firing the little fire pots or lances that are attached to the rattan backing with which the designs are traced on the set.

"Big pieces are made up of wooden frames or sections. The rattan design is placed on at the factory and the frames with the necessary lances are shipped to the scene. The operator's job is to assemble the sections, join the fuses together, or 'cut them in,' as we say, and, of course, fire the set when the proper time comes.

"A big piece like the 'Chicago Fire' made for the Century of Progress contains 500 frames, is 700 feet long and from 20 to 65 feet high. The popular 'Bombardment of Ft. McHenry' set takes 1,200 feet of fast-burning fuse, 2,880 color pots or lances, 80 pounds of chemicals and powder, 1,200 feet of pliable rattan and over 1,000 square feet of frames.

"Thrills?" Briese smiled. "What gives the crowd a thrill is pretty much routine to us. The shooters can't really see the fireworks with their faces right up against 'em but there's a lot of satisfaction in getting a good show together, licking all the problems that come up and then having people say it was swell. We get the news even if we don't come down to the footlights!

"Want to know what we're most afraid of? Rain! A few little innocent raindrops trickling out of a cloud will scare a 'shooter' more than a whole carload of bombs. Rain may mean a big loss of fireworks, and an expensive delay. We frequently carry rain insurance to protect us against these losses.

"Getting helpers on the job is one of the big problems but we have solved it pretty well by always having an expert to take charge.

(Continued on page 118)

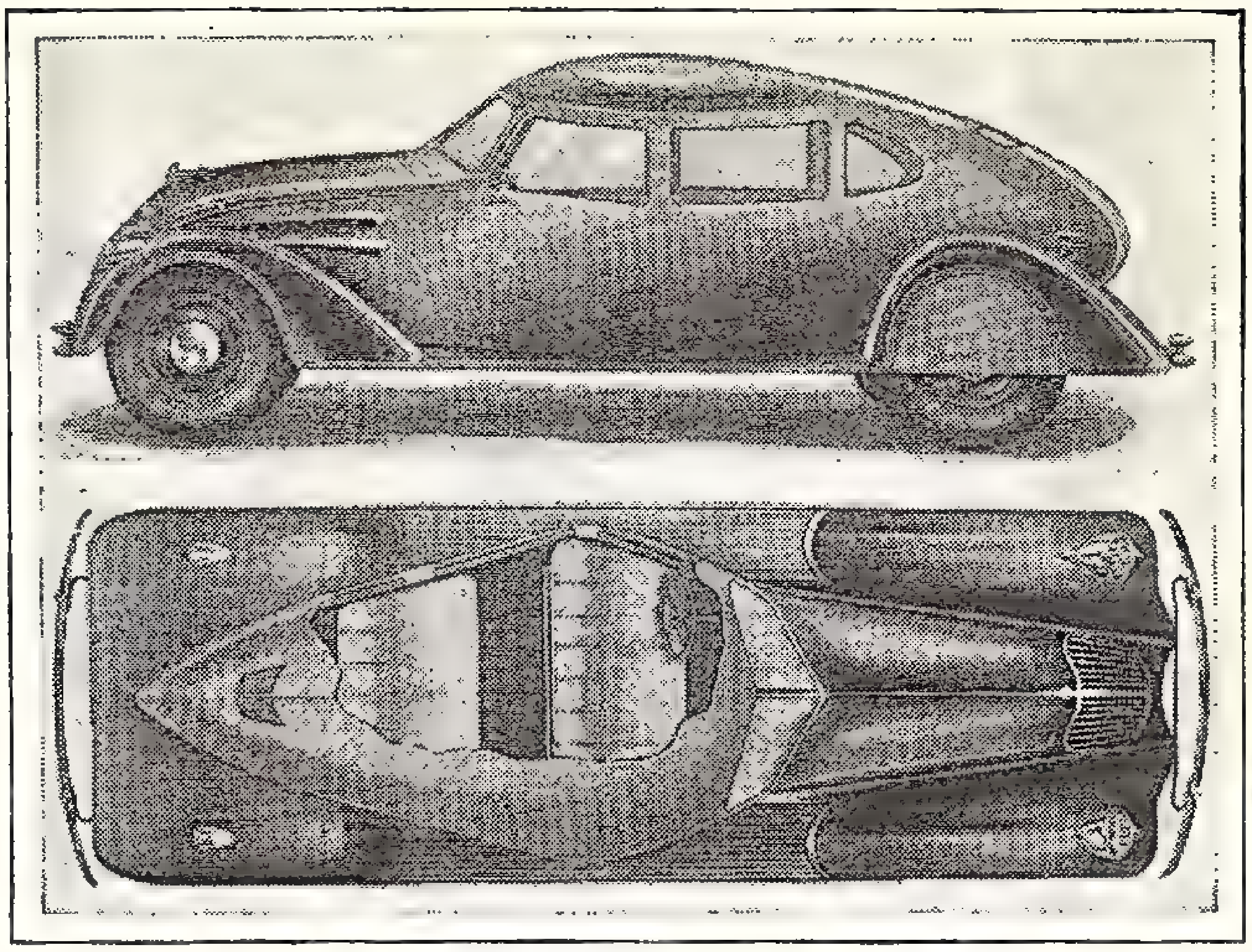
RADICAL *Streamlines Feature* 1935 *Car*

CENTERING the greatest width and height through the front seat, the new 1935 automobile, reported as accepted by one of the industry's leading manufacturers, sets a new style in modern streamlining.

The new design places a three-passenger seat in front, with accommodations for two persons in the rear seat. This arrangement permits a converging sweep toward the rear in a graceful taper to the "fish tail" stern. Hitherto, the width of the rear seat necessitated an unusual extension of the body to achieve streamlining.

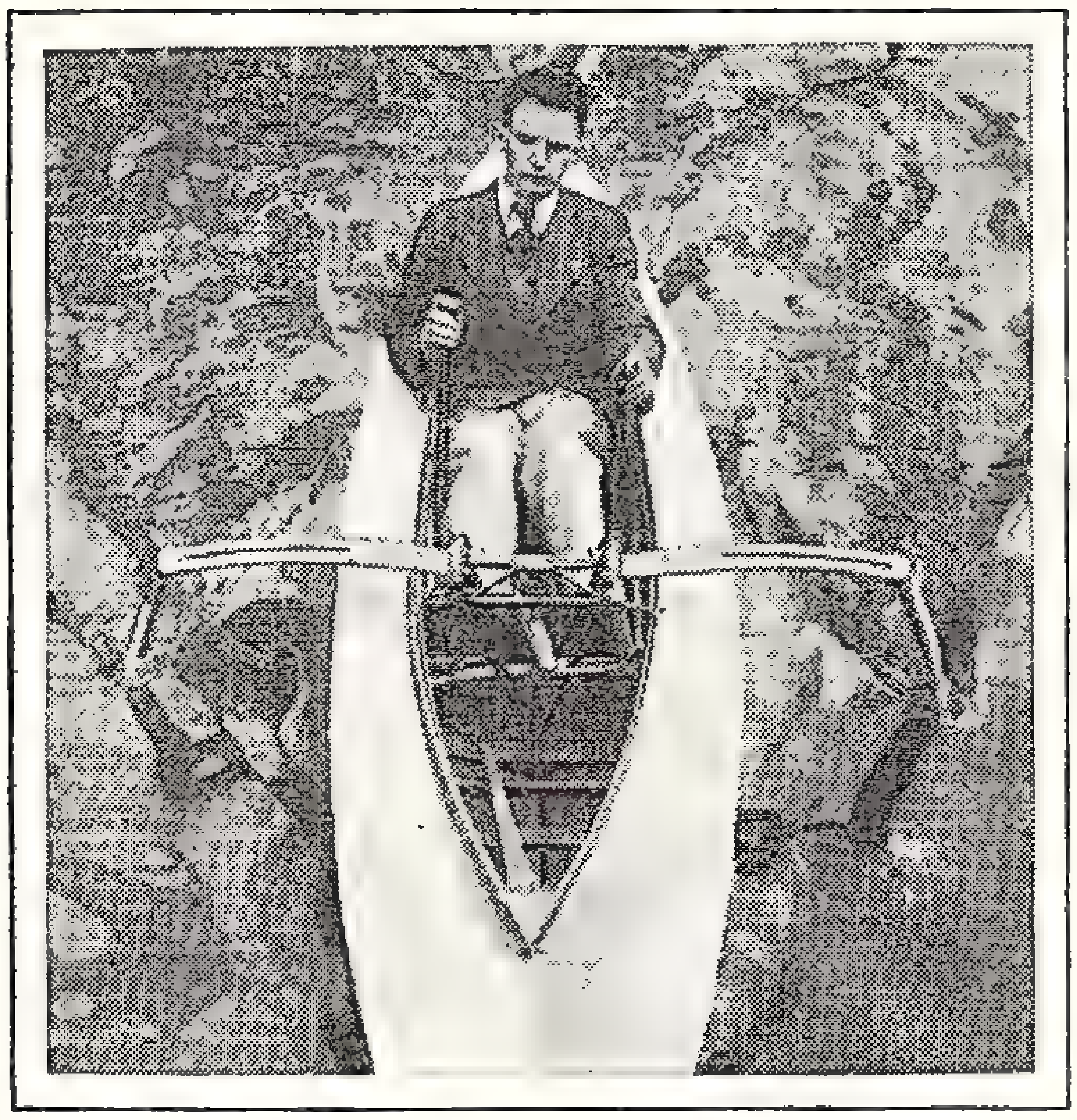
An important safety feature of the new car lies in the expansion of the field of vision from the driver's seat. The body lines converging toward the rear permit the diagonal placing of a window in the usual "blind" spot.

The windows throughout the car drop completely out of sight inside the doors.



These photos of the 1935 automobile illustrate the radical lines employed to effect streamlining. Note how seats are enclosed within wheels and how range of vision is broadened. Windows drop completely out of sight.

Vertical "Oars" Propel New Boat



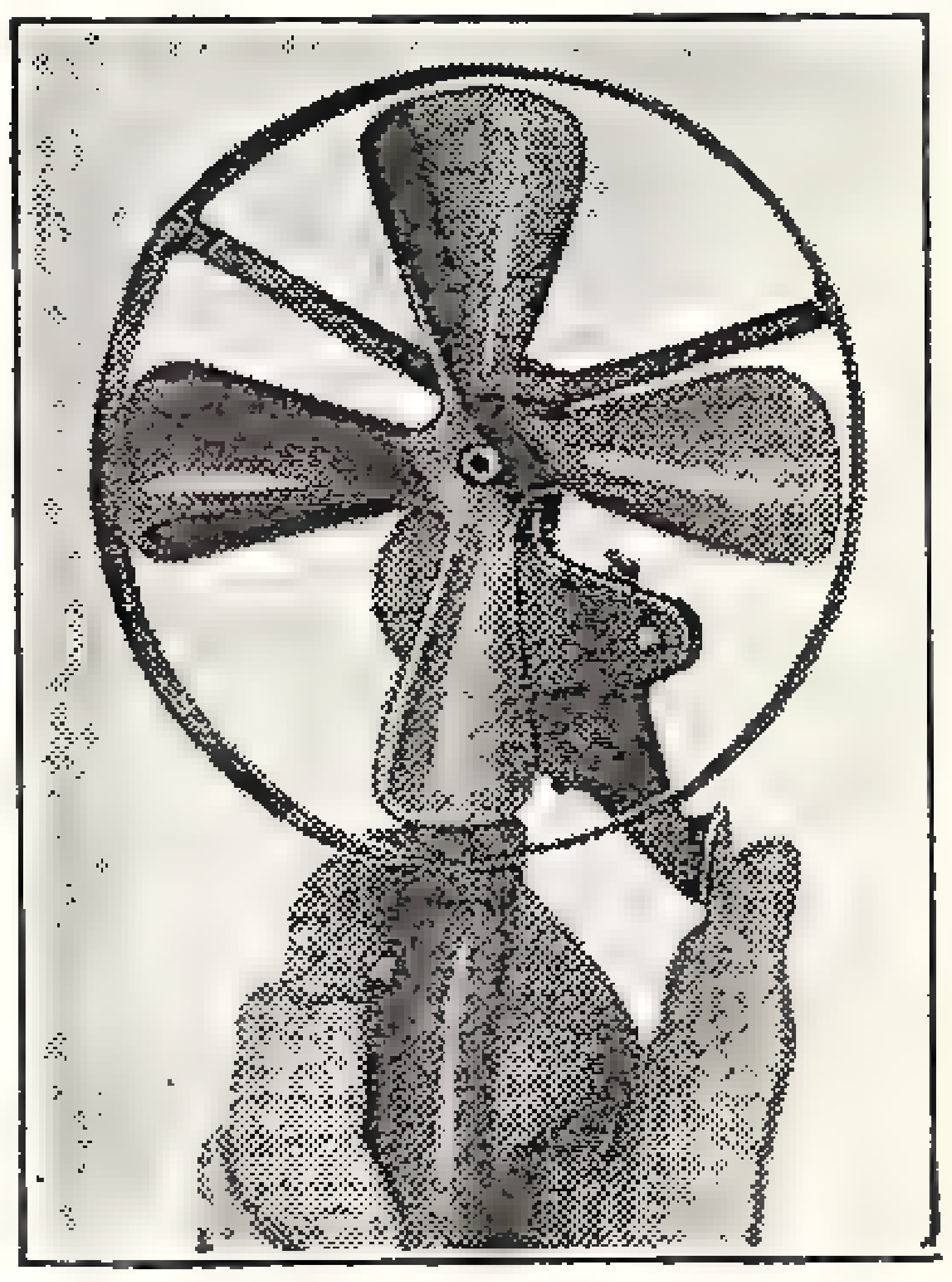
By means of a simple hand apparatus the occupant of this new German boat is able to move his vertical "oars" through the water without the labor attached to conventional rowing.

CALCULATED to reduce rowing labor, a new boat has recently appeared in Germany. Instead of the conventional oars, twin paddles, mounted vertically and moved by a simple hand apparatus, are used to propel the craft. Considerable speed is attained without tiring the rower.

Portable Fan Operates by Hand

A HAND-OPERATED fan, now available, is the newest device for promoting hot weather comfort.

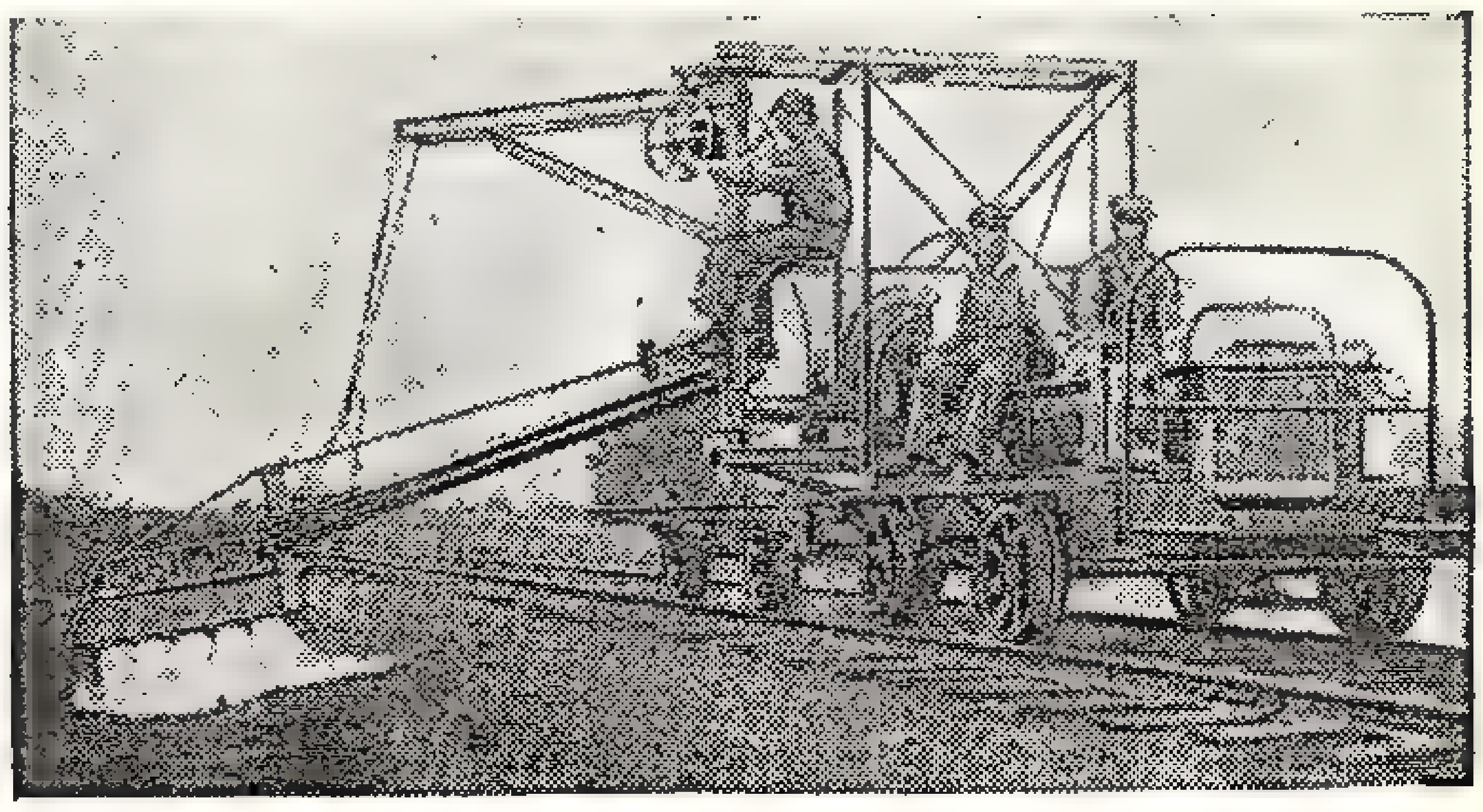
The four-bladed metal fan is set in operation by an up-and-down pressure of the thumb on a lever which engages a ratchet gear, turning the blades at a rapid rate.



Pressure upon thumb lever operates ratchet to drive blades.

Burner Destroys Roadside Weeds

AN atomized fuel-oil burner has proven successful in destroying weeds along railroad right-of-ways and highways.



This weed burner may be operated along railroad tracks, highways or in fields. Operator controls size of flame.

Trains Bugs, Flies and Spiders for Moving Picture Work

Syd Fogel, trainer of insect actors for Hollywood movies, is shown training a lazy tarantula to do a bit of high jumping through a hoop for a forthcoming mystery picture.

CANDIDATE for the strangest job in Hollywood is Syd Fogel who grooms and trains flies, worms, spiders, beetles and every variety of bug for the motion picture cameras.

A bit of syrup holds Fogel's "actors" in a given spot while thin trails of their favorite foods induce them to walk, run or fly in a definite direction. Flies are made to light and clean their wings, feet and feelers by spraying them with glue.

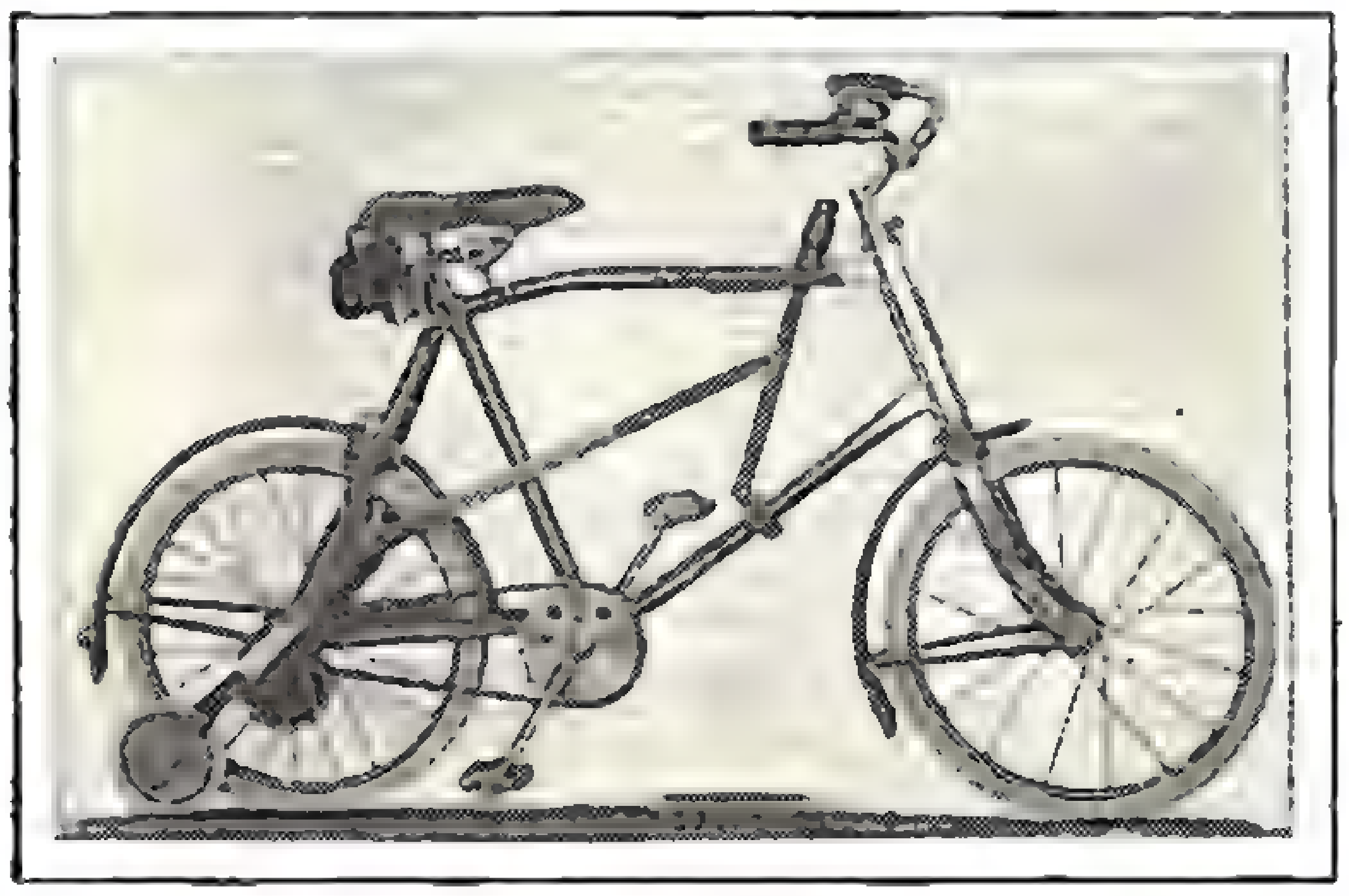
Fogel has made a thorough study of the habits of the various insects and adapts these to the needs of the picture to be filmed. The creatures are held on long leashes made of thin hairs and are always put through their preliminary paces before the cameras are turned over.

Fogel's trained insects are greatly in demand, with the result that he is kept busy the year 'round at his strange trade.

Safety Wheels Aid Bike Novice

AS A double concession to small boys who want to ride a bicycle and to parents who are afraid to let them try, lest they get hurt, a new safety bike has recently been placed upon the market.

Two small safety wheels attached to the rear axle give the bicycle the same stability as that of a three-wheeled velocipede while the youngster is learning to ride. When the beginner has had sufficient practice, a lever in front of the seat may be shifted forward, raising the safety wheels from the ground.



Two safety wheels attached to the rear axle of this new bicycle make it safe for the youngster learning to ride. The lever, mounted forward of the seat, may be shifted, raising wheels from the ground to form an ordinary bike.

Braves Sea Perils in Tiny Boat

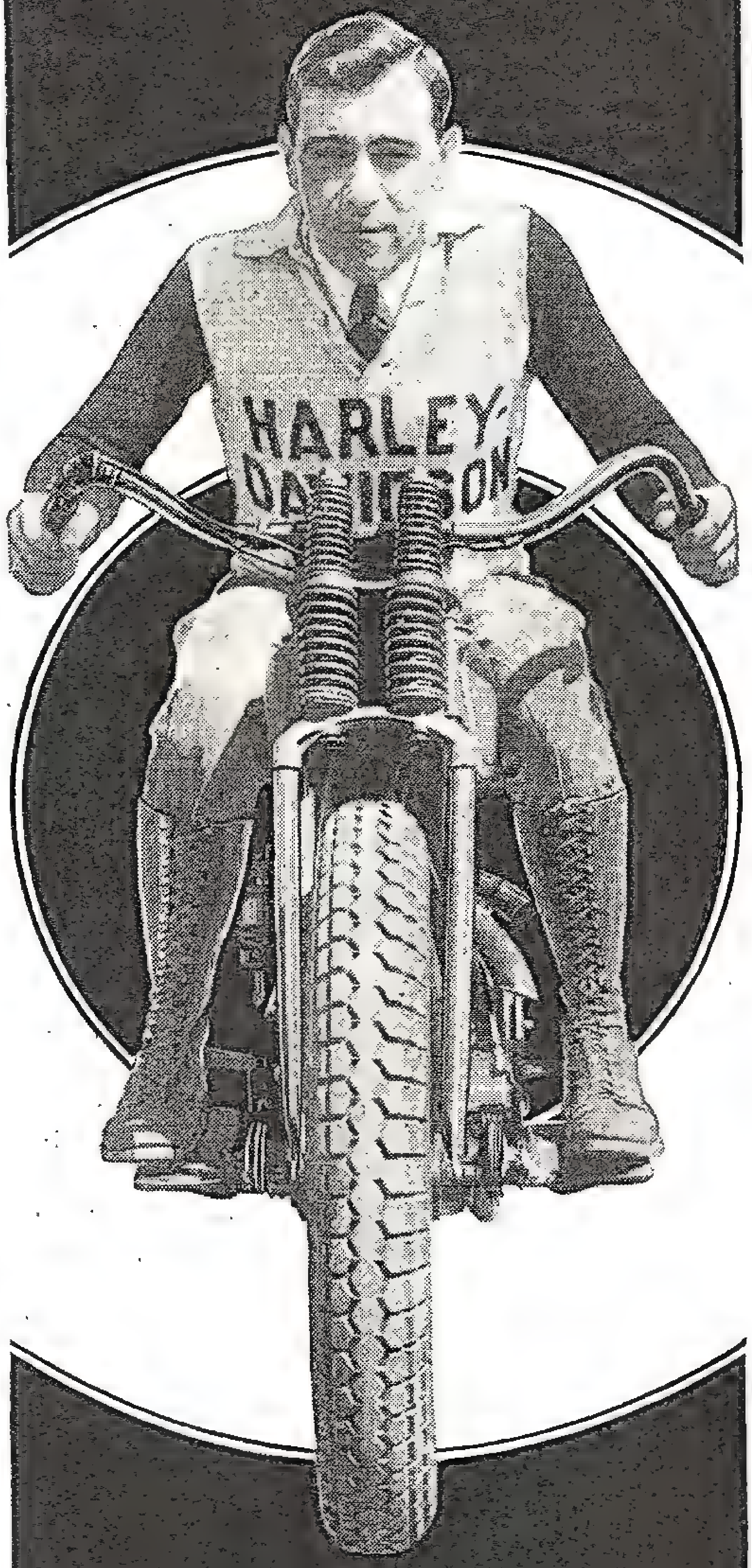
In this 14-foot craft Paul Neuhaus, of Los Angeles, matched wits with Neptune in a voyage from California to New York.

BRAVING the perils of the deep in the world's smallest ocean-going craft, a Los Angeles adventurer recently put to sea, bound from Santa Monica to New York City.

The tiny vessel is only fourteen feet long, nineteen inches wide and four inches deep. A ten foot sail supplies the motive power and twin pontoons, nine feet long, eight inches wide and five and one-half inches deep support the craft.

Riding Motor Broncos to Victory

Roaring across ditches and up impossible grades, motorcycle hillclimbers ride the most dangerous race course in the world. In this thrilling story the national champion takes you for a breath-taking ride up the practically vertical speedways.



by

JOE PETRALI

National Hillclimbing Champion

TWO hundred and fifty feet from the start on the tricky hill at Huntington, West Virginia, my motor suddenly leaped out from under me. On each side of the 20-foot course onlookers strained forward, expecting to see the machine crash down on my broken body, thus bringing to an embarrassing close my vain effort to ride over the crown of the hill.

The motor had "too much gear" and as I screwed on the power, the rear wheel pushed its way forward, the front wheel left the ground and for a split-second I was standing there, supporting the machine directly over my head.

I held onto the bars, not wishing to turn my mount loose on the crowd, pulled it around overhead and forced the motor to land on the wheels. Meantime I cut off the power. As it came back to earth I jumped on and rode, as sedately as a thwarted hill-climber can retreat from defeat, back down to the starting point.

Thrills of the Vertical Speedways

Motors loop the loop, dig their own graves on sandy hills, leap sideways as they bound over rocks, stall on particularly steep grades, leap into the air and sometimes land on their riders, crushing their arms, legs or ribs. Yet despite the ever-present dangers, professional mountain goats return each year for more thrills, hoping to roar over one more stubborn hill before turning their mounts out to pasture in some junk yard.

Thrilling business, this! Race courses from 100 to 600 feet long—grades as steep as 80 per cent—double hills—rock ledges to hurdle—ditches to jump!

For thirteen years I have been riding in professional motorcycle races. The biggest thrill I have yet had is the winning of a national hillclimbing championship. Through a combination of good equipment and skill, I won the title in 1928, 1929, 1932 and 1933. This year I will seek the championship again by riding weekly, until September, on hills scattered from California to Pennsylvania.

AMERICA'S NATIONAL CHAMPION REVEALS

There are many fine tricks—from proper carburetor adjustment to selection of chains—that have enabled me to ride to several championships. In my shop at Glendale, California, I prepare my equipment for summer events, but only after many experiments do I decide on the exact equipment and method of riding to use on a particular hill. Unhappy and sometimes painful consequences result from using improper equipment.

If the motor does not loop when a rider pours on the power, it may jackknife, causing him to catch a heel in the chain. Only skill as the motor jumps over rocks and digs its way down into soft spots can keep the machine on the straightaway and out of the crowd.

Mechanical Aids to Victory

I do not count so much on my skill to bring me through to a victory as I do upon three mechanical factors: carburetor setting, proper gear ratio and chains on the rear wheel. In no form of racing does victory depend more on how we use our fuel and how the machine responds to the controls.

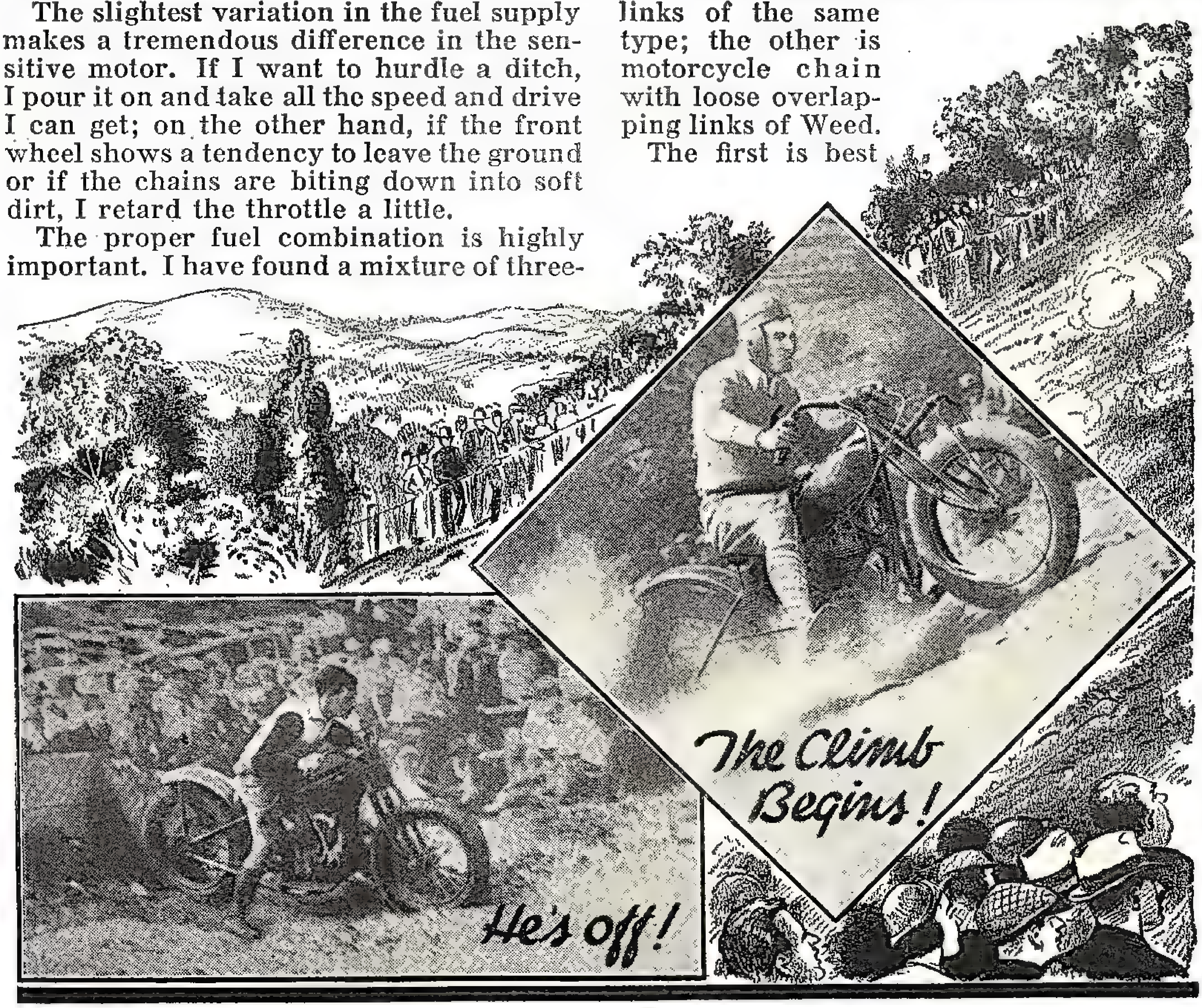
The slightest variation in the fuel supply makes a tremendous difference in the sensitive motor. If I want to hurdle a ditch, I pour it on and take all the speed and drive I can get; on the other hand, if the front wheel shows a tendency to leave the ground or if the chains are biting down into soft dirt, I retard the throttle a little.

The proper fuel combination is highly important. I have found a mixture of three-fourths alcohol and one-fourth benzol gives the greatest power and pick-up. The high speed carburetor adjustment is likewise important, requiring one full turn on the needle beyond the setting for gasoline to make the mixture rich enough. Alcohol-benzol is heavier than gas.

You can have a lot of sport riding your own motor up neighborhood hills, but if you want to get the best from your engine it will be a good idea to keep a record of all carburetor adjustments and the results in speed and power from each setting. From this you will learn how to handle your own motor. I always take this precaution.

Generally speaking, you should retard the spark and cut down on the high speed valve until the motor sneezes. Then come back on the valve until the motor will just take acceleration. With advanced spark the motor should be basically right, although you will need to make additional adjustments to suit conditions and your individual style of riding.

Do not underestimate the importance of chains. In my supply are two kinds. One is a Weed chain with loose overlapping links of the same type; the other is motorcycle chain with loose overlapping links of Weed. The first is best


The Climb Begins!
He's off!

THE THRILLS AND SPILLS OF HILLCLIMBING

Hillclimbing Facts

Weight of motorcycle—316 lbs.
Piston displacement—45 cubic in.
Speed of the motor—6,000 r. p. m.
Crankcase lubrication—castor oil.
Fuel—alcohol, 3/4; benzol, 1/4.
Length of hills—100 to 600 feet.
Length of the take-off—25 feet.
Steepness of grades—50 to 80%.

Nearing the Top!

Taking off from a level start never more than 25 feet in length, hillclimbers must hurdle ditches, scale rocky ledges and keep their mounts level on an 80 per cent grade. Photos show how last-second disaster often cheats the rider.

adapted to the soft or sandy hill and the latter seems best suited for a hard surface. More than once I have beaten a rival because he used the wrong type chain. Had my competitor done as I did—tried out both kinds on all types of hills—he might have fared better.

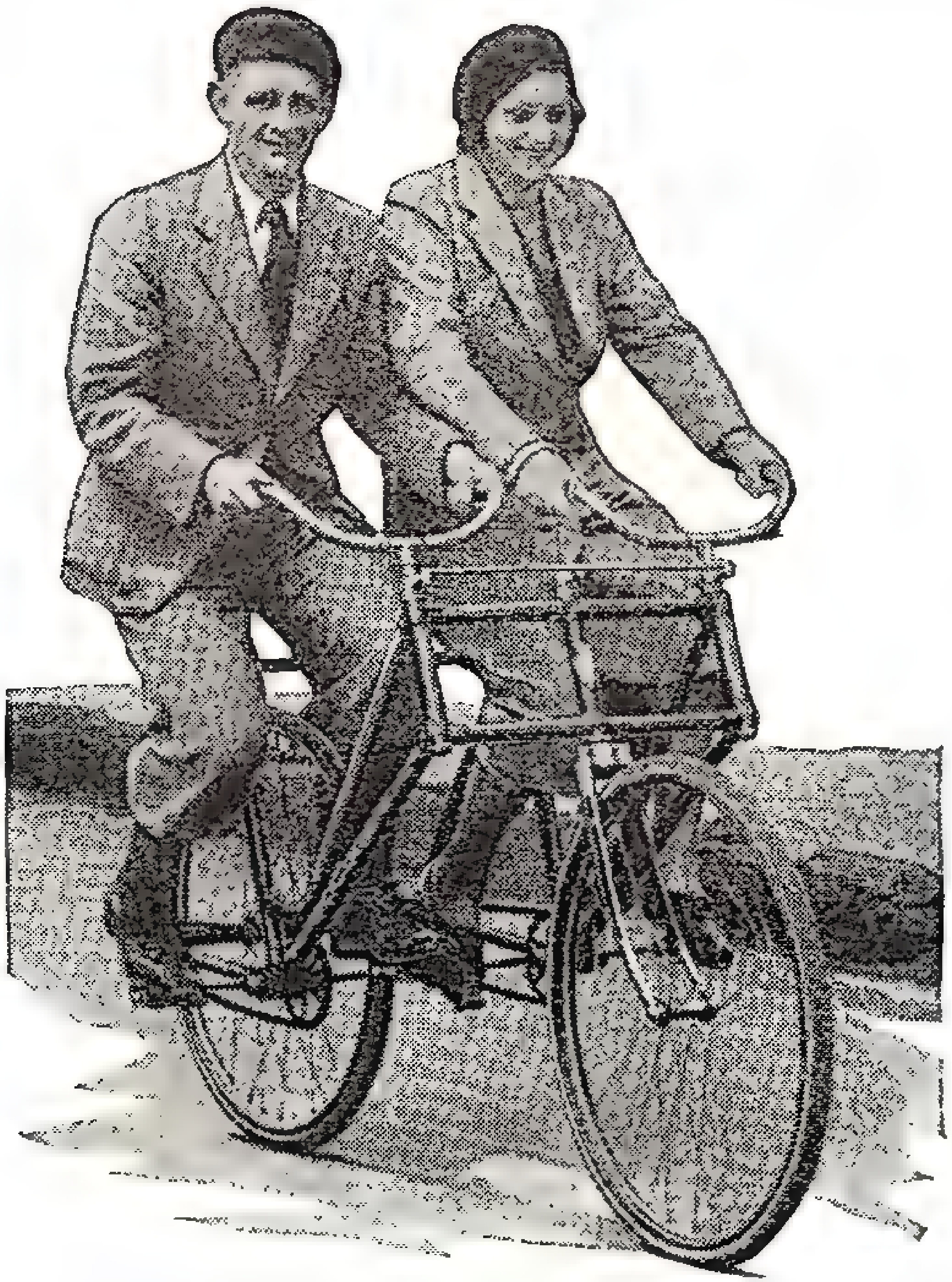
In the west I use the motorcycle-Weed combination, generally speaking, while I usually equip with Weed only in the east.

The Muskegon, Michigan, hill illustrates the need for all-Weed. This is a rather sandy climb. In practice rides last year I found the sharp edges of the motorcycle chain dug a grave for the rear wheel and left me standing near the foot of the hill. When I changed to the other type, the loose links piled up on the tight links, giving me nearly an inch of projecting chain to better my traction which enabled me to climb easily to the top.

Selection of a proper gear ratio is one of the secrets of successful hill climbing. If you have too low a gear your motor may leap out from under you; if you have too high a gear your motor will stall. In the

(Continued on page 120)

Australians Ride Side by Side on "Bicycle Built For Two"



These cyclists seem to have no trouble balancing on this "bicycle built for two"—but is it as easy as it appears? Note ingenious coupling of the two handlebars to front fork.

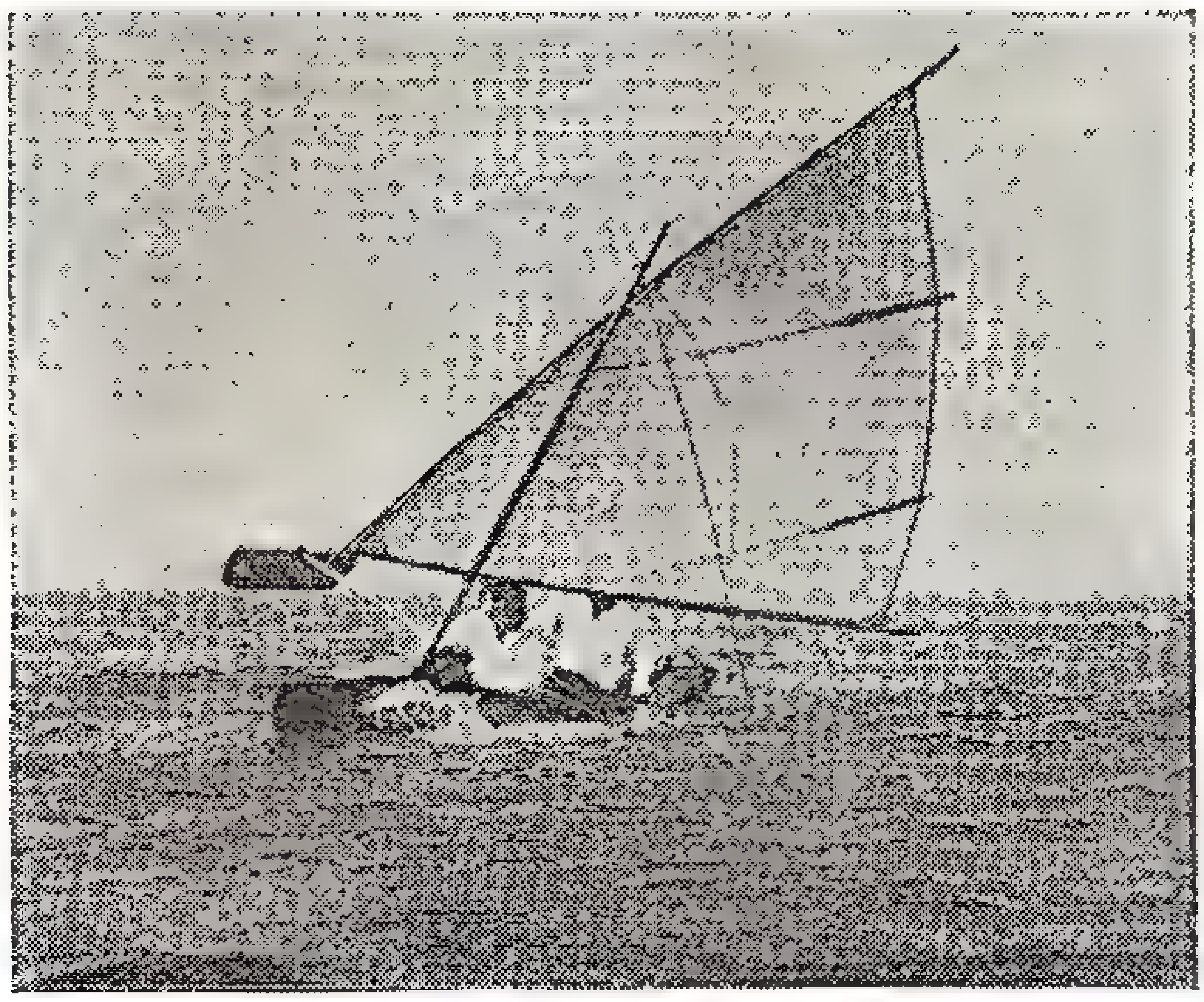
IN Australia an odd "two-seater" bicycle has been invented by Hubert Opperman, famous distance cyclist. The seats are fitted side by side instead of the tandem style commonly used. Two seats, two pedal hangers, and two handlebars are mounted on a frame made of steel tubing. An extra sprocket is added on the rear wheel. Both handlebars must be turned to steer the bicycle.

Aluminum Boat Weighs 30 Pounds

WEIGHING but 30 pounds, a novel boat having cast aluminum ribs is claimed to be the lightest of its size and capacity in the world.

The boat is designed for either hunting, fishing, camping, or sailing. The sail rig can be attached in a few minutes.

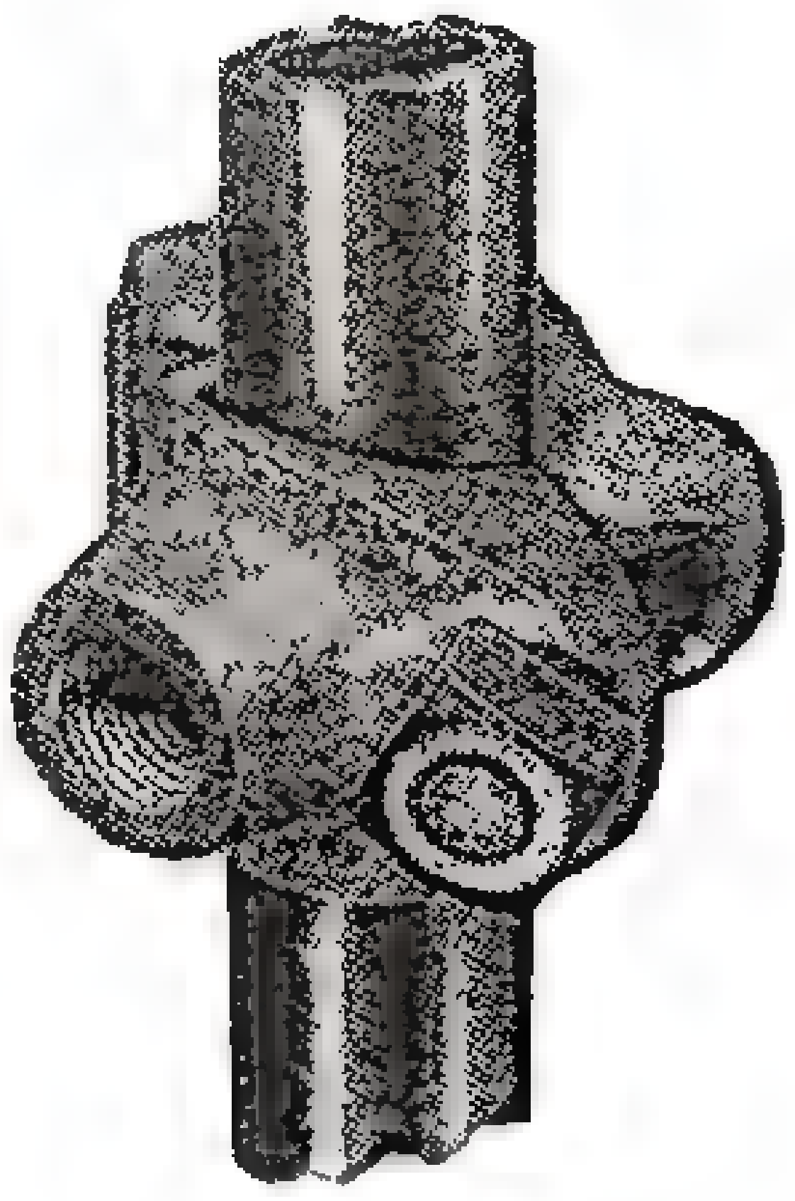
This boat was recently placed on the market in construction kit form and also as a completely assembled unit.



Hunt, fish, camp, or sail with this 14-ft. aluminum rib boat. Complete boat without sail rig weighs only 30 lbs. Craft will carry two men together with camping equipment.

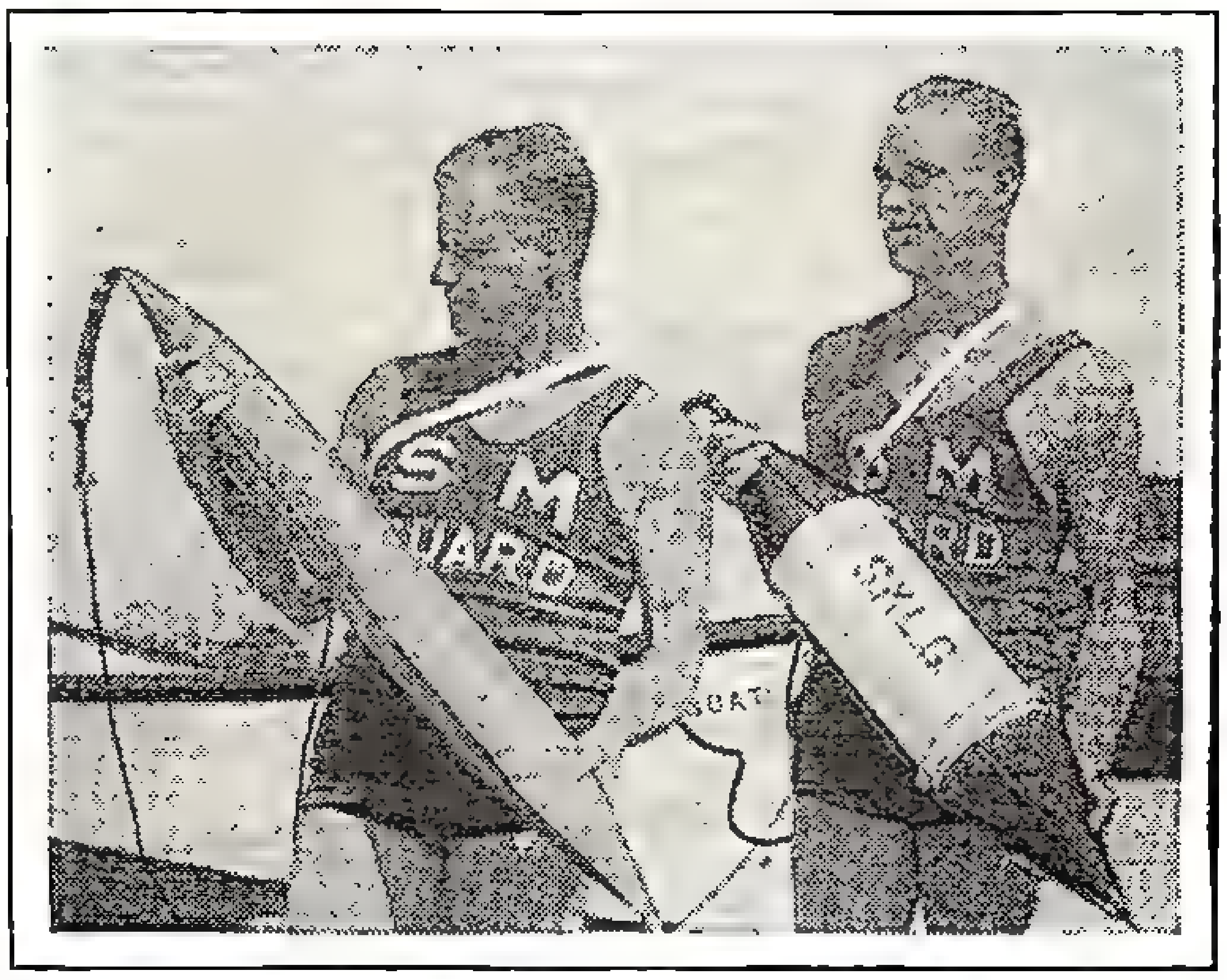
Tap Pipe Easily With New "Tee"

A NEW "tee" now makes it possible to tap pipes in less than 6 minutes, without even shutting off the gas or water. The "tee" is a saddle which is bolted securely to the pipe. A hole is then drilled into the pipe, and a plug or new connecting pipe screwed in place immediately to prevent any escape of gas or water.



With this saddle, pipes can be tapped easily in six minutes.

Guards Adopt Rubber Life Floats



Capt. George Watkins (left) displays rubber rescue tube he invented; Lieut. Pearson holds old type metal float.

RUBBER rescue tubes intended to be thrown out to swimmers in distress are now being adopted by life guard stations on Southern California beaches.

The 42 inch long heavy rubber tubes weigh only ten ounces when completely inflated to two pounds air pressure. They will support 50 pounds dead weight, or a 200 pound man.

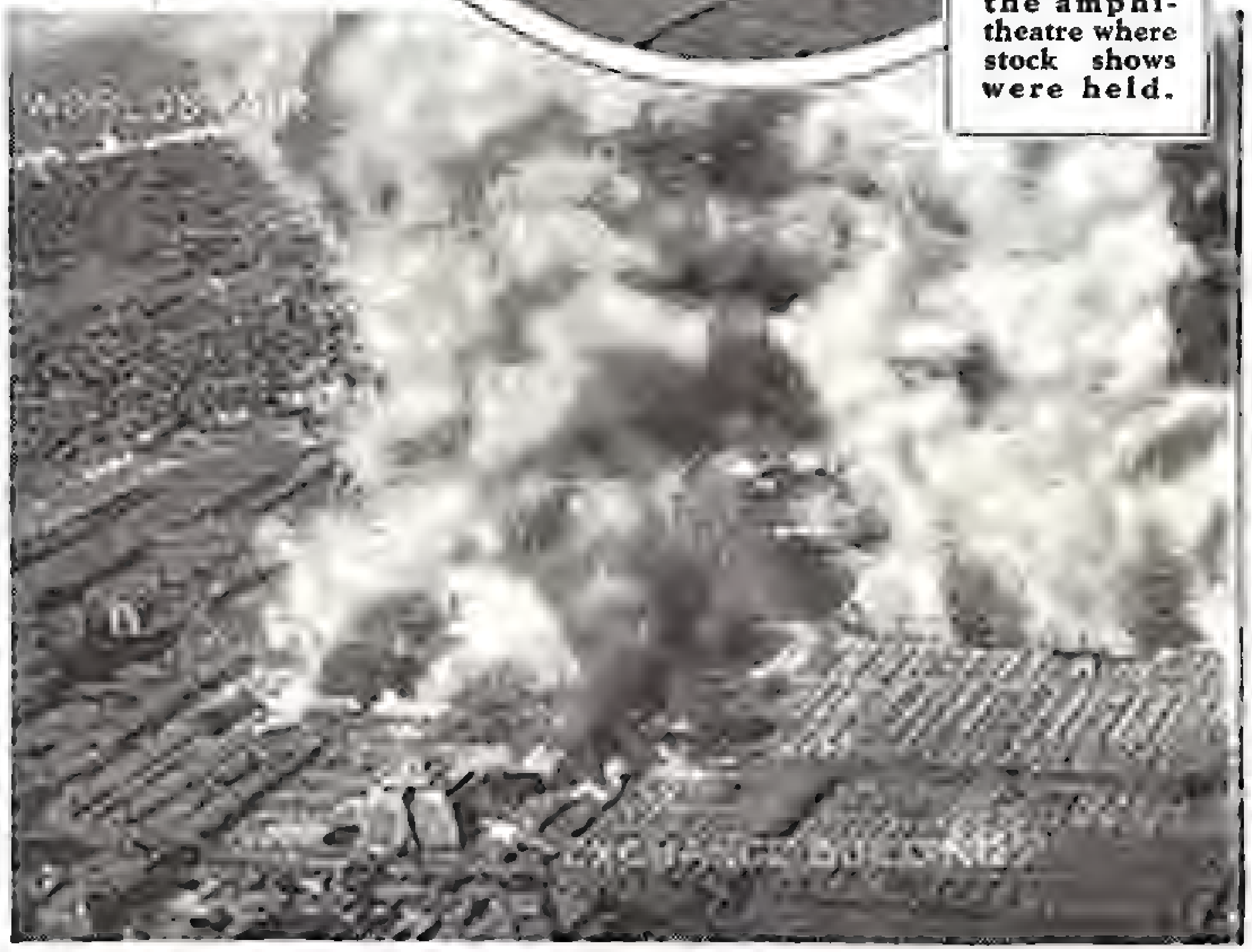
The soft rubber tubes are much easier to tow out to a rescue than the old metal type. As many as four floats may be taken out by one guard.

The old metal "cans" have been known to bounce around and hit rescuer or rescued on the head in a heavy sea.

New Chicago Stockyards To Be Fireproof

The nine story Exchange Building shown here was the tallest structure destroyed in Chicago's recent fire.

Only twisted steel girders remained of the amphitheatre where stock shows were held.



An aerial view of the gigantic blaze sweeping towards the World's Fair grounds on Lake Michigan. Photo was taken before Exchange Building caught fire.

A RIVER of water 4 feet deep, 50 feet wide and 15 miles long was required to bring under control Chicago's greatest fire since the disaster of 1871. In all 120,000,000 gallons of water were pumped over the 80 acres that were burned in the recent Union Stock Yards fire which destroyed property to the value of $10,000,000.

Bringing the fire under control was not entirely a triumph for modern fire fighting methods. It took 3,000 firemen, 138 fire companies from all of Chicago and many of its suburbs, 41 hours before a shifting wind came to the rescue.

The conflagration, however, did bring out stronger than ever the necessity of fireproofing in large cities. As a result the latest principles of fire prevention were employed in the reconstruction that took place as soon as workmen could enter the burned over area. Steel and concrete pens, silos, loading chutes and runways will replace the wood framework that was wiped out.

Despite the fact that 113 buildings were destroyed, business was carried on as usual. Temporary offices were set up, six hours after the fire was out, in emergency shacks, on the sidewalks, and in box cars on railroad sidings.

Science was called to the rescue to help rediscover the valuable records that were destroyed in banks, exposition buildings, and offices in the fire area. In the charred ruins investigators sought and carefully preserved the crumbling ashes of burnt paper. By means of infra-red photography experts will be able to bring back many records.

Fortunately duplicates of precious records of prize cattle were found intact in a vault five days after the fire. In another case valuable bank papers and currency in a vault that had been heated to a white hot mass were found in good condition. Safety deposit vaults in the banks were only slightly damaged.

Problems of STAGING *a*

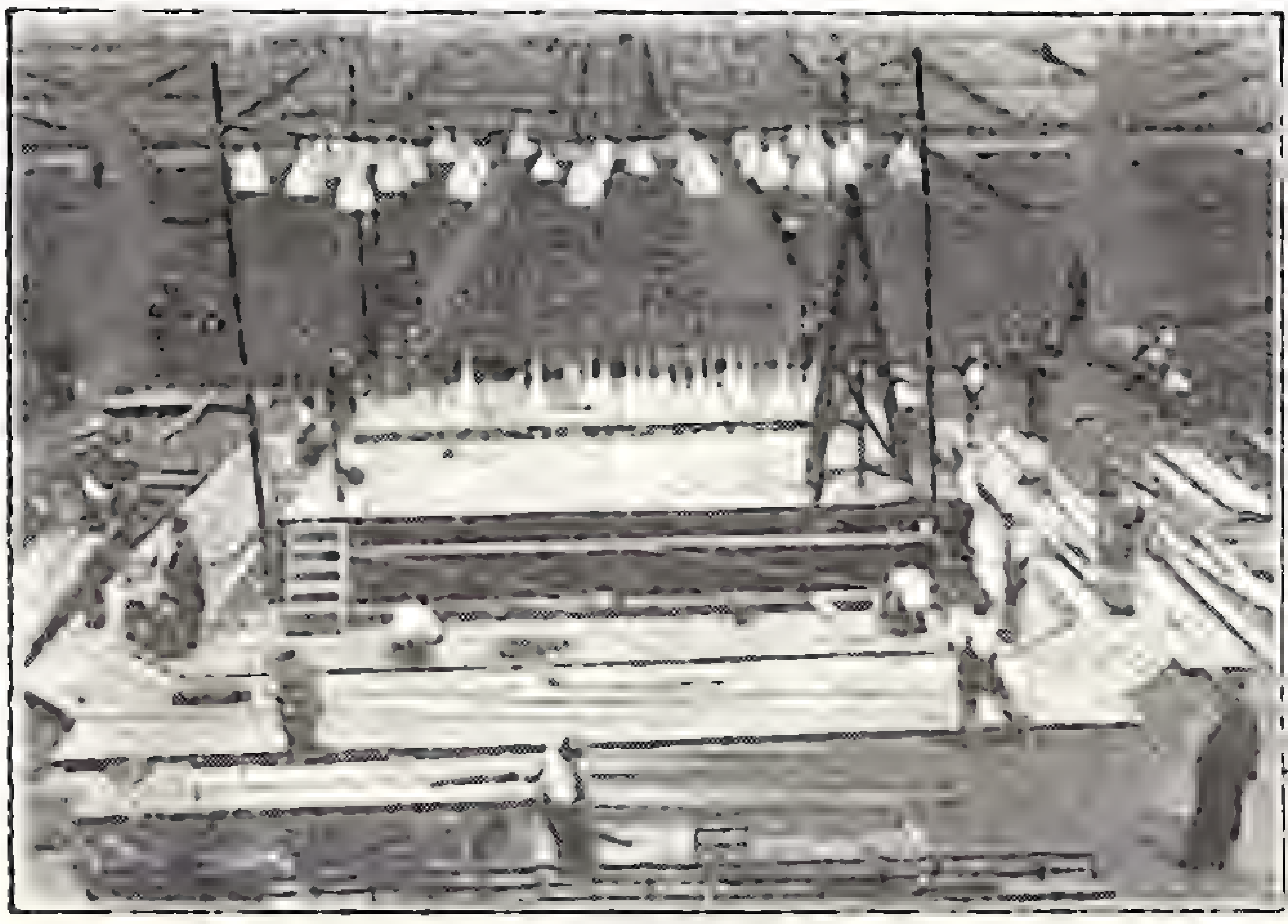
Putting on a big fight for throngs of 72,000 and the anxious outside world calls upon all the ingenuity of showmanship. How Madison Square Garden, of New York, does it is described here.

MADISON Square Garden's Long Island Bowl in New York, scene of the Primo Carnera-Max Baer heavyweight championship fight, is a triumph for the science of outdoor sport dramatics. Behind the scenes of this world's championship match are the latest mechanical marvels and an organization of showmanship, surpassing all previous open-air spectacles in the boxing business even in the days of the great Tex Rickard.

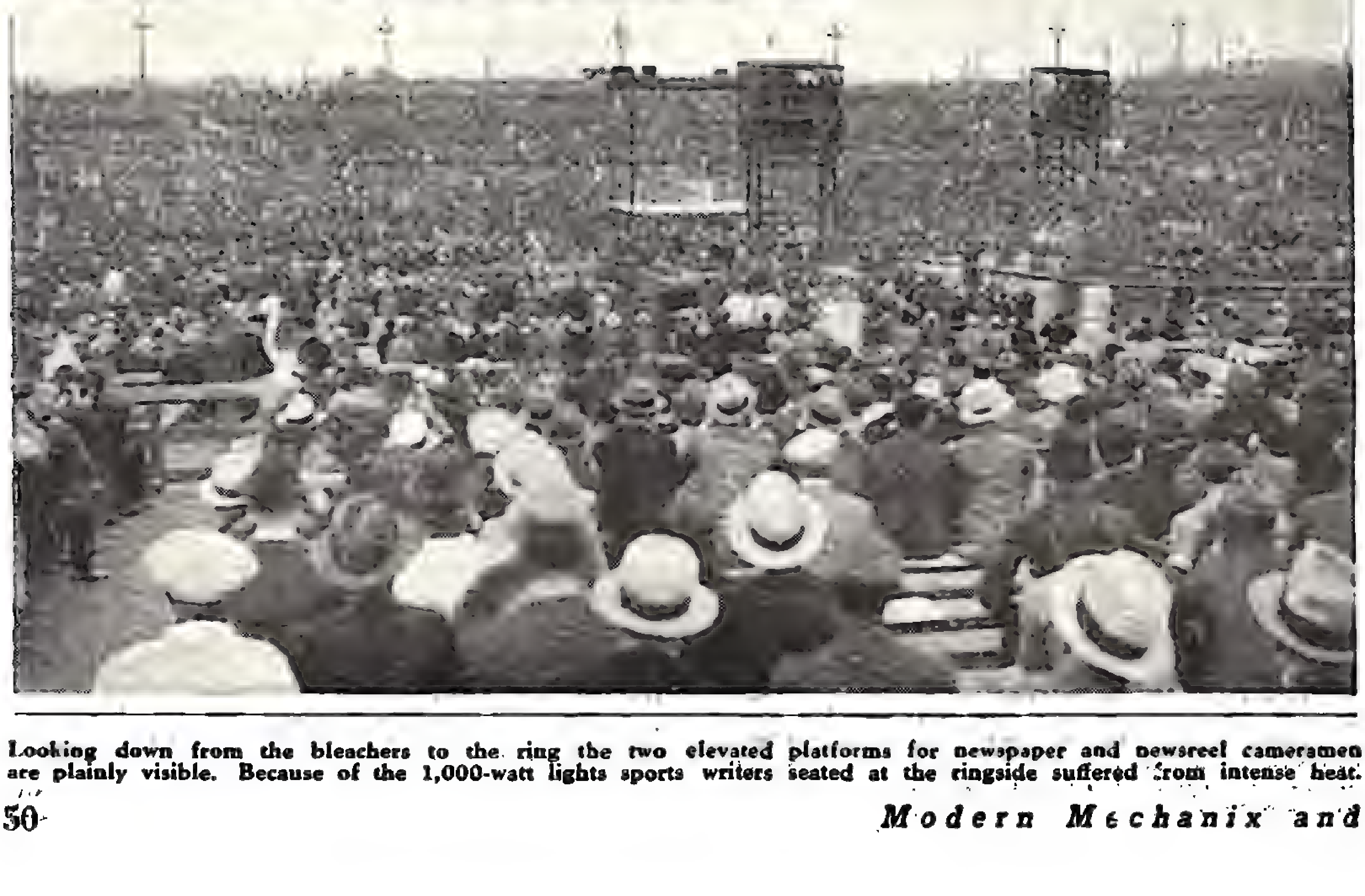
Engineering geniuses of the Madison Square Garden Corporation, headed by Lionel Levy, famous architect of the Long Island Bowl, made improvements in the bowl after a careful survey of conditions during the Jimmy McLarnin-Barney Ross welterweight championship fight in May.

The technicians regarded the prior show as "a dress rehearsal," and all details of lighting, seating, vision, and safety were checked over with penetrating caution, to insure the success of the heavyweight title fight.

The lighting effects are under the direction of Frank Niskern, an engineer formerly with the General Electric Company, but enticed into the outdoor entertainment business by Madison Square Garden. It was Niskern who improved lighting arrangements after ringside sports writers protested that the heat from scorching ring lights made their work unbearable.



At left is a closeup of the ring under construction. Forty-five 1,000-watt lights are hung in the framework to which is also attached batteries of megaphone loudspeakers.



Looking down from the bleachers to the ring the two elevated platforms for newspaper and newsreel cameramen are plainly visible. Because of the 1,000-watt lights sports writers seated at the ringside suffered from intense heat.

Championship Fight

by ALFRED ALBELLI

A staff of more than 1,500 is needed to control throngs of 60,000 to 72,000 persons attending the big fights. Here is an air view as crowds filled the Long Island Bowl for the Jimmy McLarnin-Barney Ross welterweight match.

Problems that came up during the McLarnin-Ross fight were solved before Primo Carnera (left) and Max Baer met for their heavyweight championship battle in the big bowl.

Forty-five 1,000 watt electric lights were suspended 15 feet over the ring during the McLarnin-Ross fight. Before the heavyweight fight Architect Levy summoned photographers and newspaper reporters to the Madison Square Garden Bowl and they were directed to assume their places. The cameras were placed on stands 25 feet from the ring. These stands are steel towers, elevated above the ringside seats.

After considerable experimenting, Levy and the photographers agreed that a height of 22 feet was practical and saved the newspaper men from scorching heat.

The engineers then checked up on the loud-speaker system. Four highly sensitive microphones were suspended 15 feet over the center of the ring and connected to loudspeakers posted at the four corners of the framework holding the lights.

An electrical network in turn reproduced announcements by means of amplifiers scattered throughout the arena.

The outside world was not forgotten by the Madison Square Garden Corporation. Telegraph keys were posted beside each reporter's seat so that sportswriter and telegraph operator could work rapidly without interruption. Special telephones were installed, contacting the reporter at the ringside with his distant newspaper editorial room.

Another innovation was the telephone system from the ringside to the dressing-rooms where opponents and their handlers were notified when their bout was to go on.

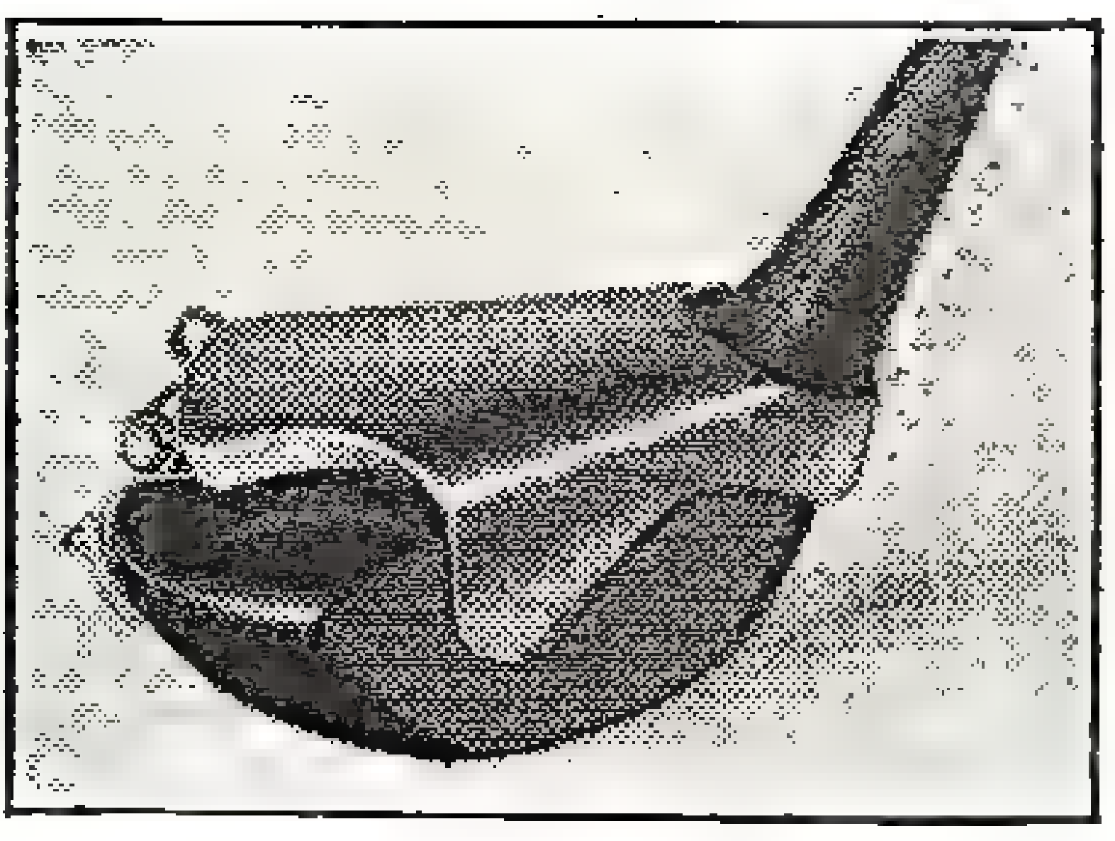
By a re-arrangement of the seating plan, so that only one inch was subtracted from the space between rows, Levy was successful in increasing the seating capacity from

(Continued on page 121)

Baseball on Stilts Simplifies Job of Reaching High Ones

A NEW twist to an old sport is being introduced by cadets of Valley Forge Military Academy who play baseball on stilts. Each player takes the field with a pair of stilts about five feet long strapped securely at the ankle and above the knees. The sport is not without its thrills and spills; but just what happens when a player slides for home or attempts to scoop up a hot grounder are matters for conjecture.

Club-Weight Improves Golf Swing



Weight slips over club-head, tending to perfect the swing.

AN EASILY attached weight which slips over the head of wood clubs is said to develop a proper golf swing. Weight straightens drives and builds "follow through" action.

Electric Device Curries Horses

Photo shows horse being "vacuum cleaned" with new electrical curry comb. Dirt is drawn through hose into bag.

SCIENCE has abolished the old curry comb in up-to-date stables with a new electrical grooming device for horses and cattle.

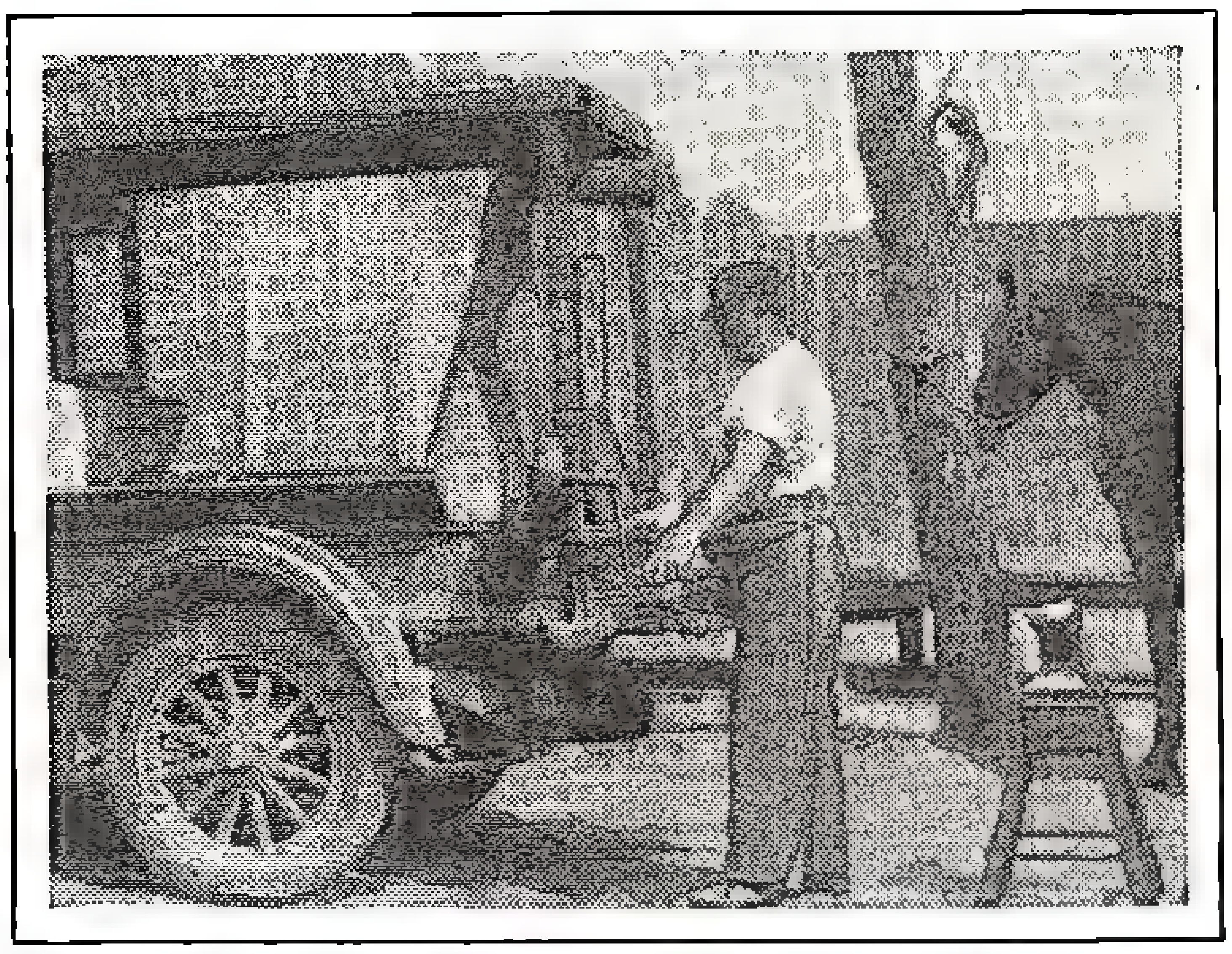
The old method, while effective, transferred most of the dust and dirt from the animal to the man. By use of the electrical comb, however, all debris is drawn into the bag of the device, which operates much like a vacuum cleaner. A thorough cleaning is accomplished in half the time required by the old method.

Cadets of Valley Forge Military Academy combine baseball and stilt-walking in a game that is replete with numerous thrills and spills.

Blacksmith Sets Up Shop in Auto

THE modern blacksmith is abandoning his stand under the old chestnut tree and is taking to the road with his bellows, forge and anvil mounted in a truck.

One of the enthusiastic exponents of the portable smithy is Ed McCaa of Pasadena who goes out after business instead of waiting for business to come to him. He has installed a hand-operated blower and a small forge in the rear of his truck. A vise falls into place when the tail gate is dropped and the anvil and its standard are set up on the ground. A big stock of horseshoes is carried in a special cabinet.



The portable smithy shown above solves the problem of shoeing horses on estates located some distances from a city shop. All necessary equipment—bellows, forge, anvil and assorted shoes—is carried in the rear of the truck.

Powderless Gun Hurls Shells 100 Miles

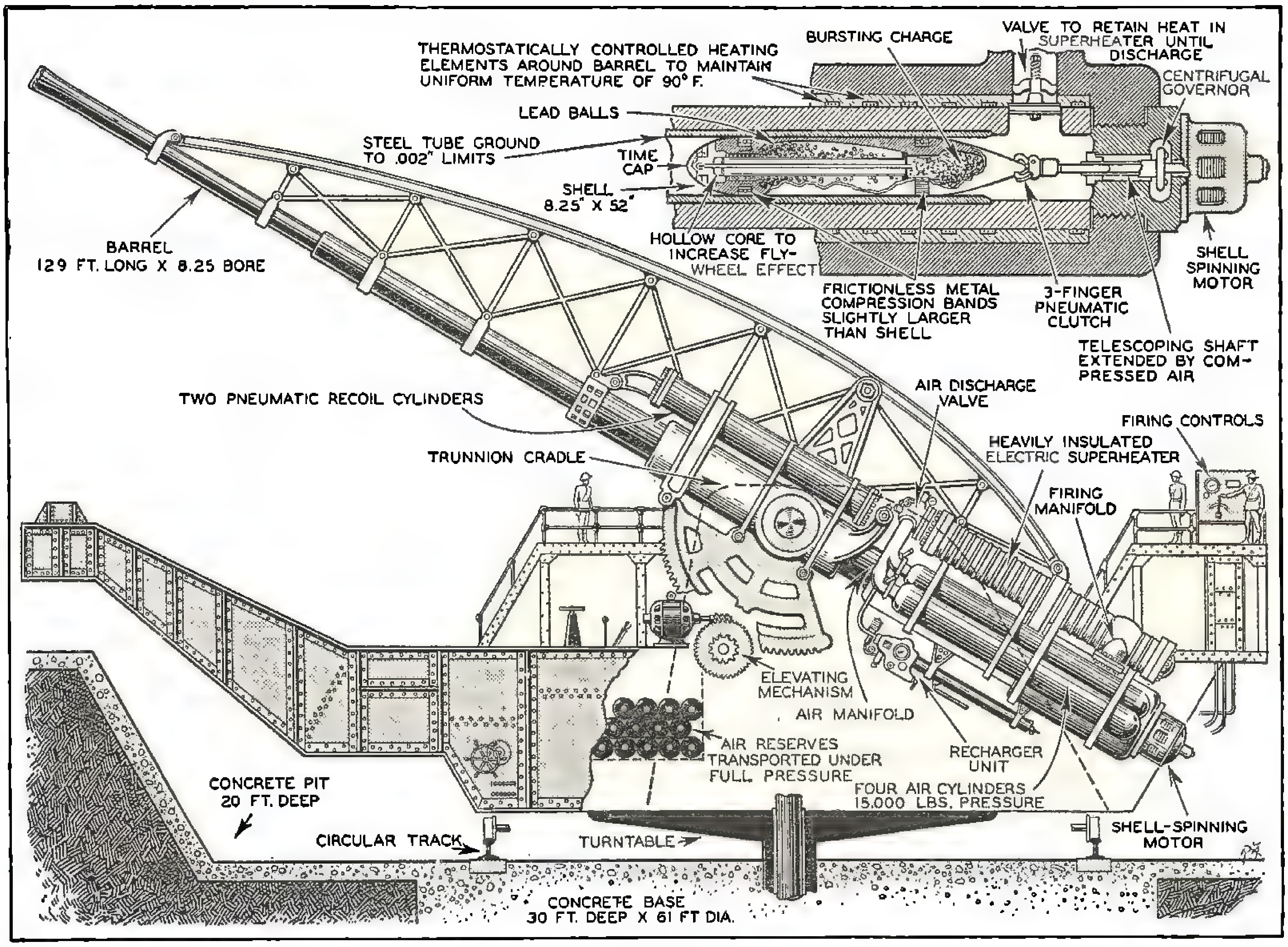
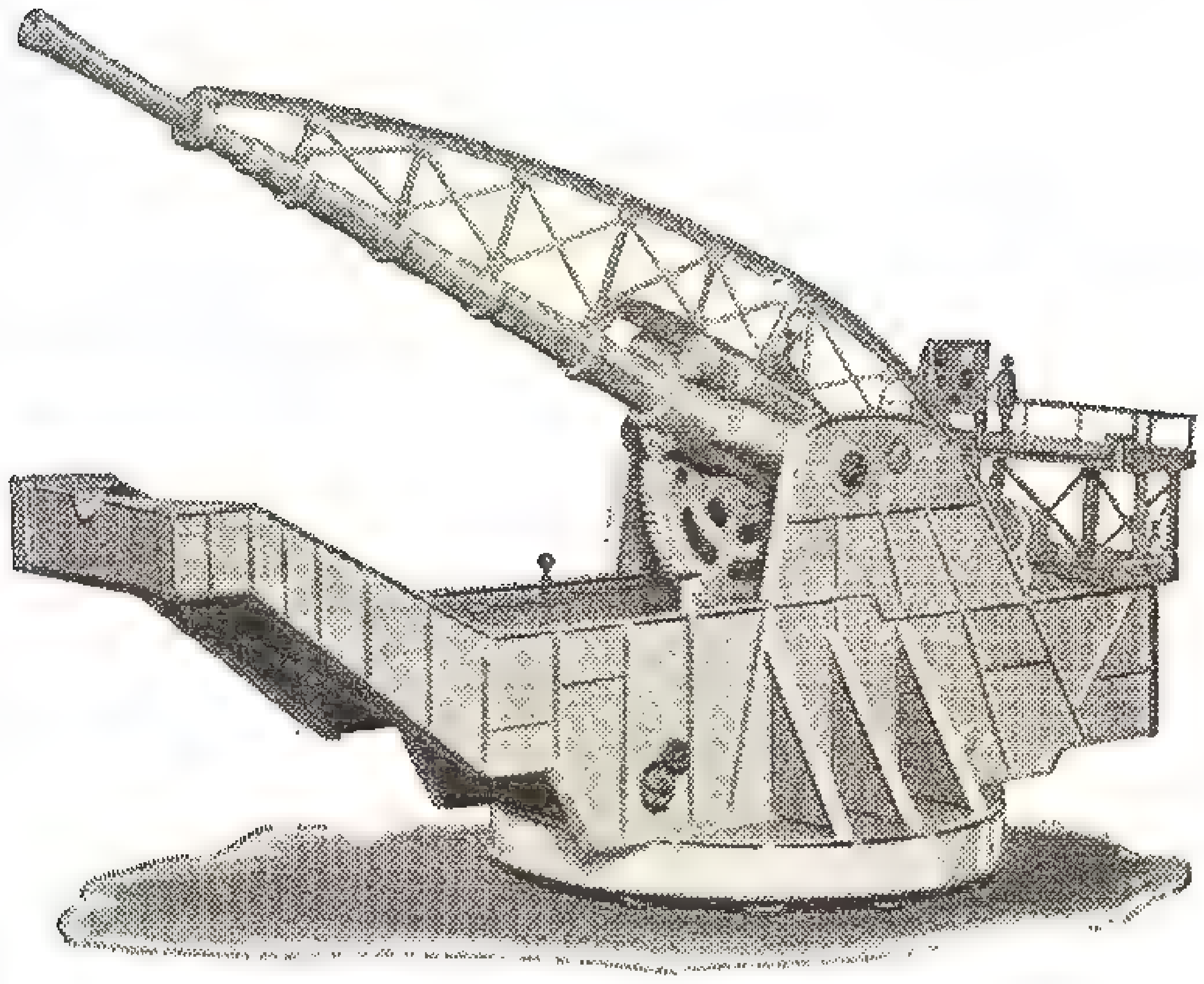

BURSTING CHARGE
VALVE TO RETAIN HEAT IN SUPERHEATER UNTIL DISCHARGE
THERMOSTATICALLY CONTROLLED HEATING ELEMENTS AROUND BARREL TO MAINTAIN UNIFORM TEMPERATURE OF 90° F.
CENTRIFUGAL GOVERNOR
LEAD BALLS
STEEL TUBE GROUND TO .002" LIMITS
TIME CAP
SHELL 8.25" X 52"
HOLLOW CORE TO INCREASE FLY-WHEEL EFFECT
SHELL SPINNING MOTOR
BARREL 129 FT. LONG X 8.25 BORE
FRICTIONLESS METAL COMPRESSION BANDS SLIGHTLY LARGER THAN SHELL
3-FINGER PNEUMATIC CLUTCH
TELESCOPING SHAFT EXTENDED BY COMPRESSED AIR
AIR DISCHARGE VALVE
TWO PNEUMATIC RECOIL CYLINDERS
FIRING CONTROLS
HEAVILY INSULATED ELECTRIC SUPERHEATER
TRUNNION CRADLE
FIRING MANIFOLD
ELEVATING MECHANISM
AIR MANIFOLD
AIR RESERVES TRANSPORTED UNDER FULL PRESSURE
RECHARGER UNIT
CONCRETE PIT 20 FT. DEEP
FOUR AIR CYLINDERS 15,000 LBS. PRESSURE
SHELL-SPINNING MOTOR
CIRCULAR TRACK
TURNTABLE
CONCRETE BASE 30 FT. DEEP X 61 FT DIA.

Diagram of proposed gigantic compressed air gun, with breach block detail at upper right. Bore is ground glass-smooth, and oiled before each shot. Four air cylinders are used for each shell. Huge proportions make permanent base necessary.

THE staggering cost and brief life of the World War Paris guns inspired Hi Sibley, a California inventor, to design a powderless long range gun. It is claimed the new gun will hurl perfectly streamlined projectiles to unprobed heights of the stratosphere. Missiles of destruction could be dropped on armies and hostile cities hundreds of miles away with deadly accuracy. The life of the German long range guns was but little more than one second, but the new pneumatic gun would last indefinitely.

There would be no need of wasting thousands of dollars in firing other guns each time the long range gun is fired, merely to conceal its position, as was done with the Paris gun. The compressed air gun would make a report but little louder than that of light artillery.

Frictionless-metal compression bands on the shells fit to within thousandths of an inch into the glass-smooth barrel of the pneumatic gun. Just before firing, the shell, supported on ball bearings inside the compression bands, is started spinning by a high speed electric motor. A clutch on the drive shaft projecting through the breech block grips the tail of the shell, but releases automatically when the compressed air charge is turned on.



Photograph of one of latest models of compressed air guns, with every bit of mechanism accurately reproduced to scale. Elevating and turning mechanisms are electrically operated.

Even though clearance between shell and barrel is less than that between piston and cylinder in a steam engine, there is very little wear on the barrel. Before each shot the barrel is lubricated with a specially designed atomizer spray which travels the entire length of the gun barrel.

Radio HUNTERS SEEK

Treasure Island!
OSCILLATOR
RECEIVER

Above—The beach at Cocos Island, goal of the treasure seekers, showing rude shack left by other expeditions. Right—A radio metal finder, similar in principle to that used by the English gold hunters. A change in the radio tone signal indicates the presence of buried metal.

ANSWERING the challenge of ghostly buccaneers, an English expedition, armed to the teeth with modern scientific equipment, is preparing to lift the world's greatest treasure hoard—the pirate gold of Cocos Island.

Lying in the upper reaches of the South Pacific, about 500 miles south by west from Panama, Cocos Island has been the perennial goal of treasure seekers ever since the bloody days when pirates roved the tropic waters and hid their booty on the famous isle.

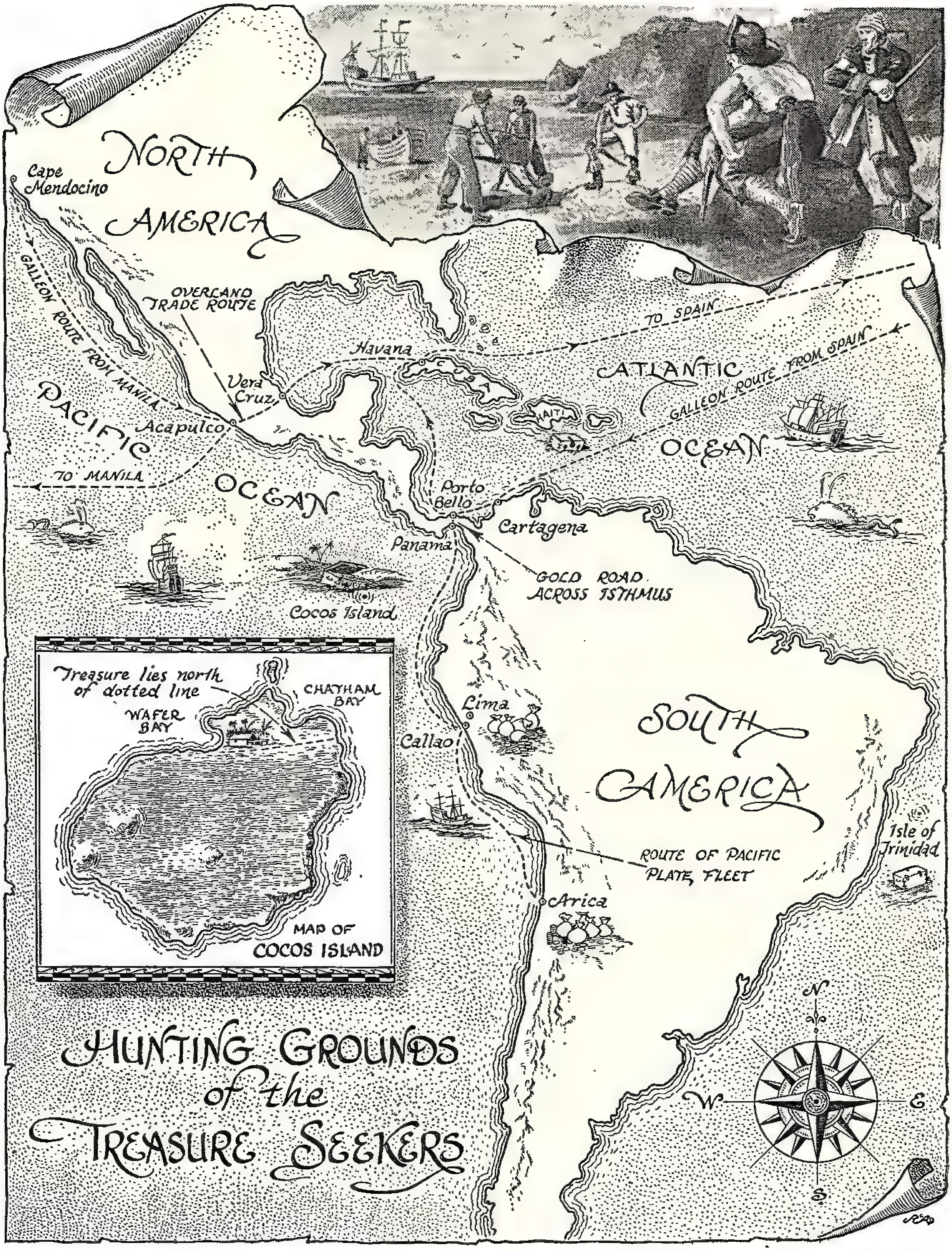
Hundreds of tons of gold and silver bullion lie buried in the jungle depths of Cocos Island—in fact, well founded estimates place the total value of the long-lost hoard as high as $60,000,000. This is the treasure which the English expedition hopes to find after countless others have failed.

Headed by Commander F. A. Worsley, Captain of Shackleton's *Eudurance* in the Antarctic Expedition of 1914-16 and sailing master of Shackleton's *Quest* in 1921, the English group is basing their hopes of discovering the treasure upon the use of a new scientific machine embodying radio-electric principles. An electric field is set up on the surface of the earth by means of electrodes connected by wires to a portable battery case and a ratiometer mounted on a tripod. These electrodes are moved about to form a rectangular "grid." Any conductor of electricity lying underground—and gold and silver are among the best conductors known—will show a disturbance in the regularity of this grid easily detected through headphones worn by the operator. Once the presence of the precious

(Continued on page 134)

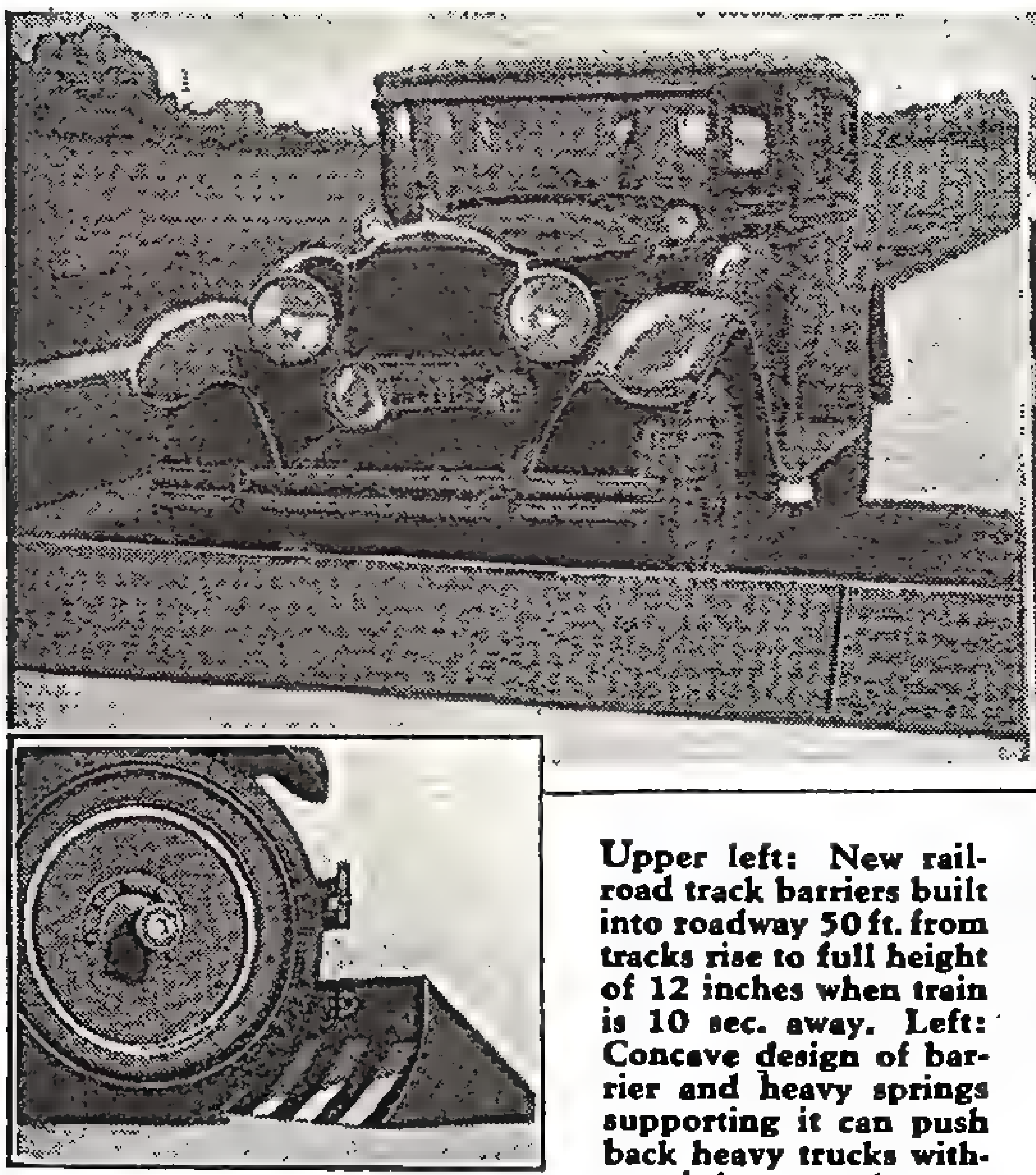
PIRATE GOLD

by **LEONARD WALTERS**


NORTH AMERICA
Cape Mendocino
GALLEON ROUTE FROM MANILA
OVERLAND TRADE ROUTE
Havana
CUBA
Vera Cruz
Acapulco
PACIFIC OCEAN
TO MANILA
TO SPAIN
ATLANTIC OCEAN
GALLEON ROUTE FROM SPAIN
HAITI
Porto Bello
Cartagena
Panama
GOLD ROAD ACROSS ISTHMUS
Cocos Island
Treasure lies north of dotted line
WAFER BAY
CHATHAM BAY
MAP OF COCOS ISLAND
Lima
Callao
SOUTH AMERICA
ROUTE OF PACIFIC PLATE FLEET
Arica
Isle of Trinidad
N
W
E
S
HUNTING GROUNDS of the TREASURE SEEKERS

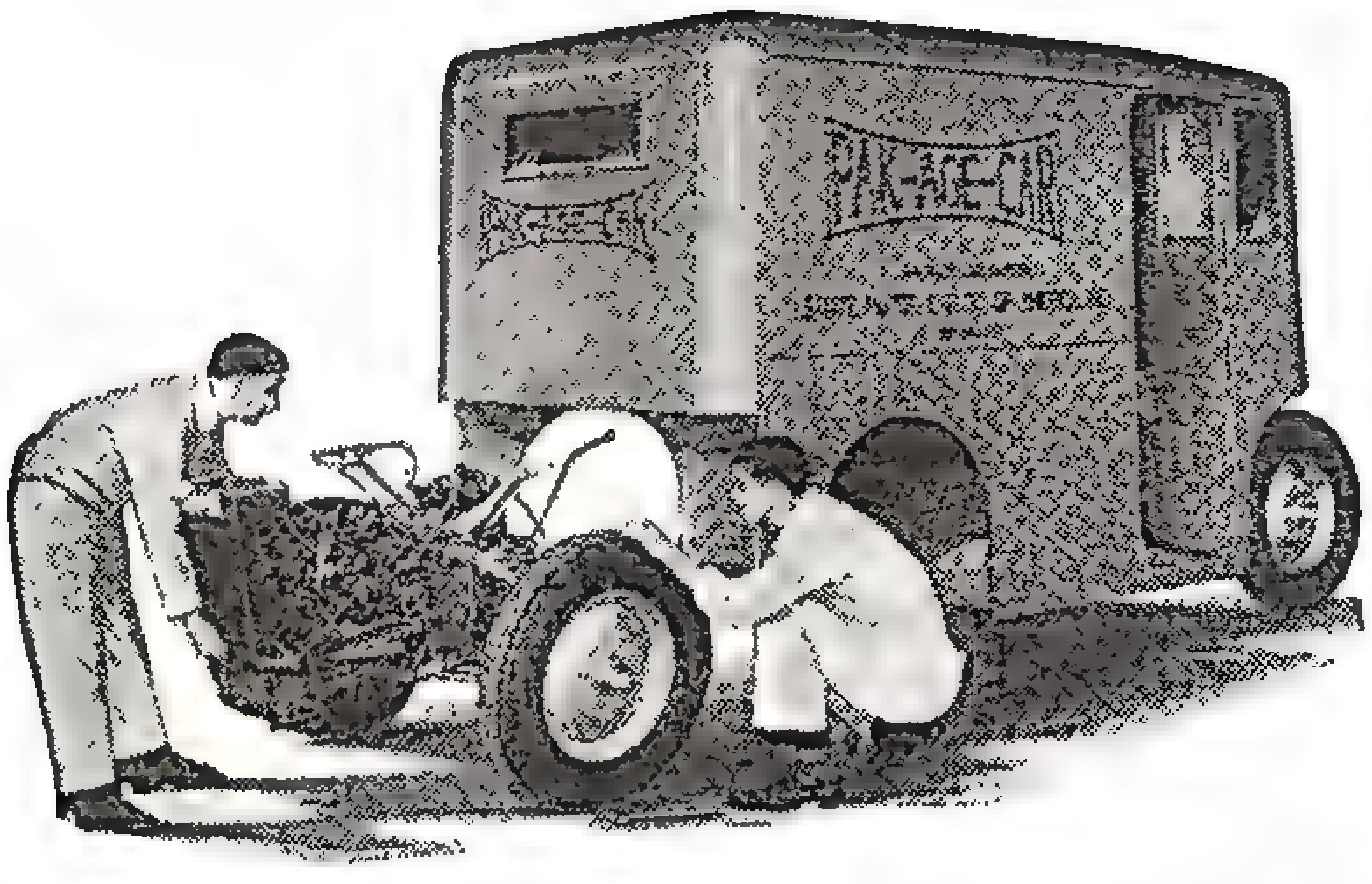
The graphic map above plainly shows why Cocos and its surrounding territory are such rich grounds for the treasure seekers. Spanish ships once sailed from Manila to Acapulco, Mexico, with cargoes valued at $10,000,000. Other galleons, laden with gold and silver, sailed from Arica and Callao to Panama, where shipments were transported across the Gold Road to Porto Bello. Some of these ships were driven on the reefs by storms where their cargoes were lost. Others fell into the hands of Drake, Morgan and Cavendish, who looted them and buried their treasure. Likewise, the Spanish ships plying the West Indies were waylaid by Captain Kidd, Lafitte and Blackbeard. Much of their plunder is reported still buried in Cuba, Haiti, Tortuga, Jamaica and St. Kitts. The isle of Trinidad presumably hides another pirate hoard.

TRACK *Barrier* LEADS AUTO *Devices*



Upper left: New railroad track barriers built into roadway 50 ft. from tracks rise to full height of 12 inches when train is 10 sec. away. Left: Concave design of barrier and heavy springs supporting it can push back heavy trucks without injury to the car.

A LIFE SAVER BARRIER which rises automatically out of the roadway to stop approaching autos as a train reaches the crossing is designed to prevent future grade crossing accidents. The barrier rises 4 inches when the train is 20 seconds away, but cars can still get across. At the 10 second period it rises to its full height.

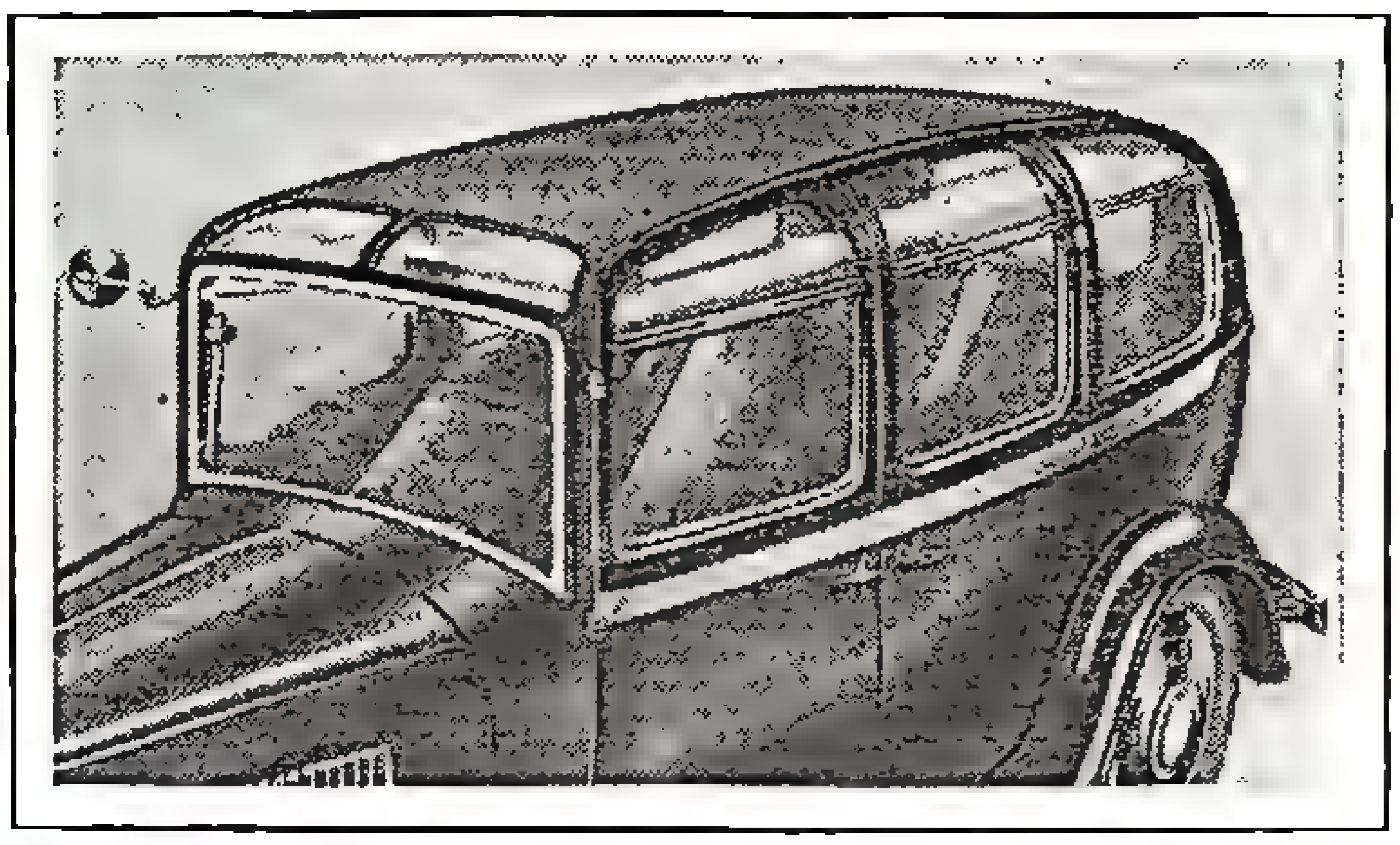


Designed to replace horse and wagon on milk routes, new delivery car has power plant which can be entirely replaced in 15 minutes. The engine is built on rear axle.

DETACHABLE POWER PLANT on the latest milk delivery truck can be "unhitched" and replaced with a new gasoline "horse" in 15 minutes. Although the small engine is mounted on the rear axle, the control system is simple. Starting off is just as easy as picking up the reins and saying "giddap." The entire delivery car costs about as much as a good horse and milk wagon, but is said to be more economical in operation. Since high speed is unnecessary a small engine is used.

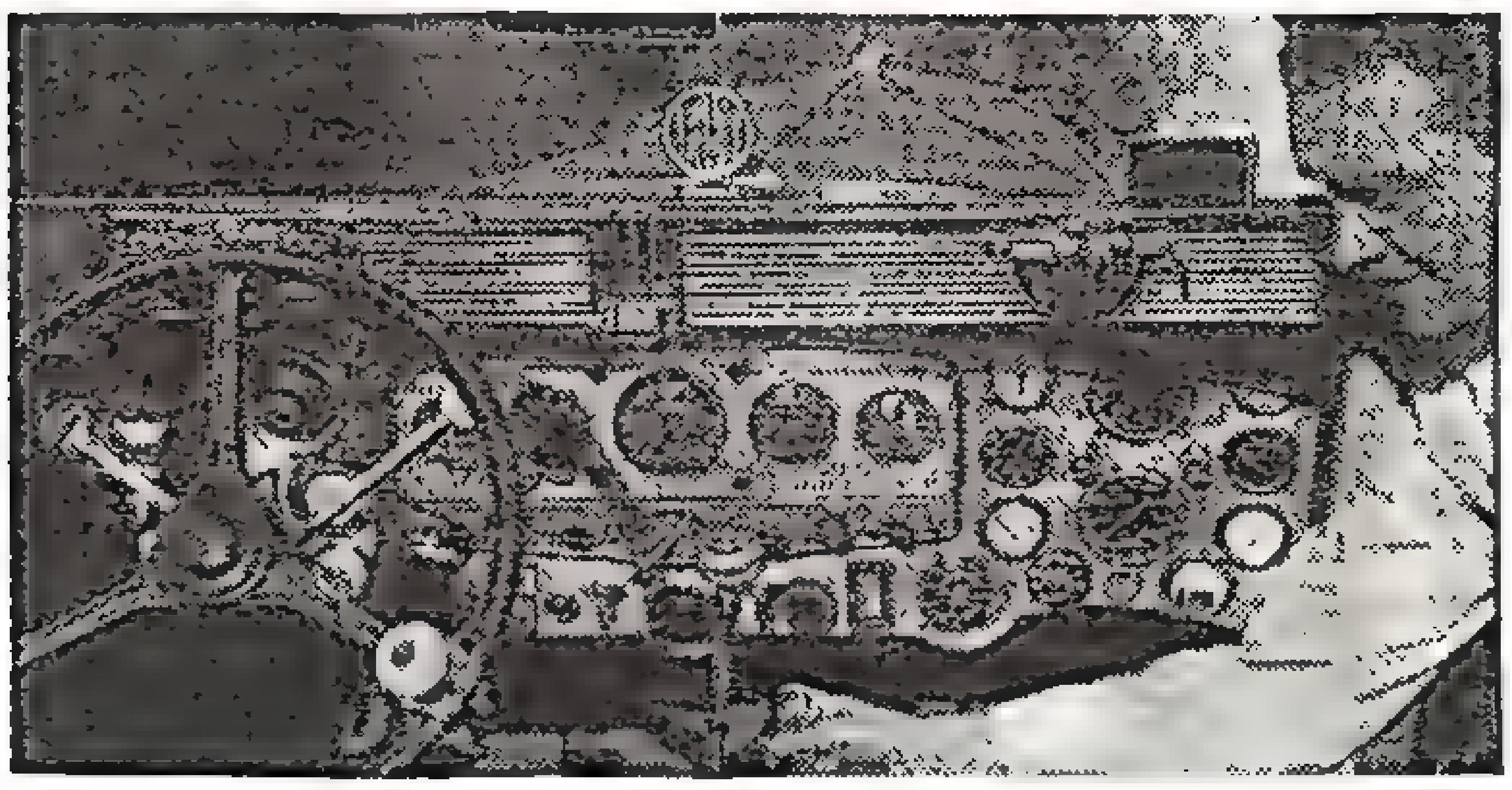
Lights flash, bell rings, barrier rises before train passes.

AUTO SKYLIGHTS have been patented by Mrs. Manchester, a widow living in Bournemouth, England, to give passengers in sedans an improved view of the countryside.



To improve view of countryside while touring, English widow has patented method for replacing curved portion of auto roof with special plate glass skylights, as shown.

EVERY AUTO GADGET obtainable has been installed by Lyndon Grover to give him the most completely equipped automobile dashboard in Hollywood. A few devices such as barometer, altitude meter, tachometer, and pressure gauges have been borrowed from airplanes. The operation of every part of the car can be checked.



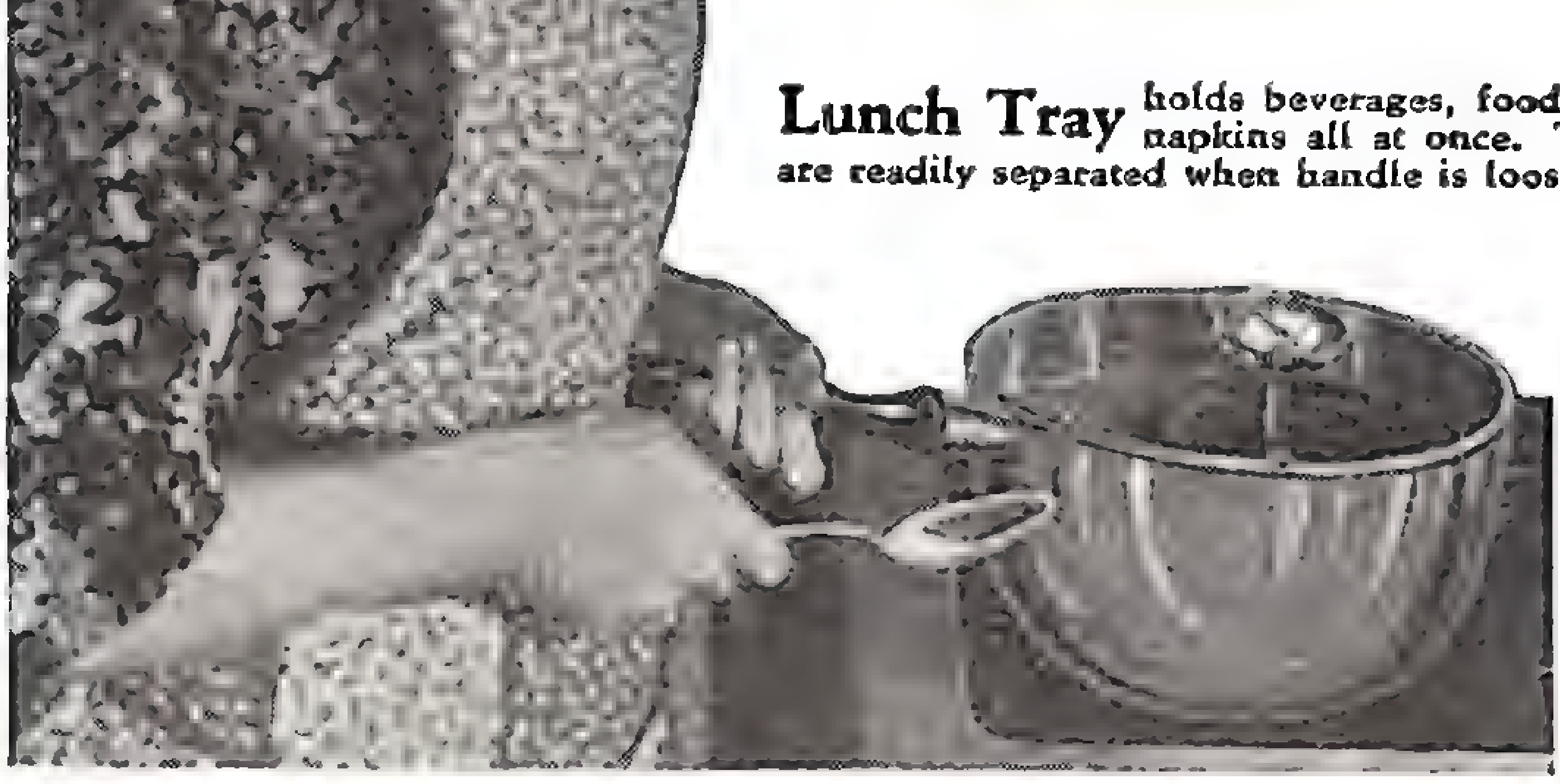
Most completely equipped auto dashboard in Hollywood is this, being inspected by Joe Morrison, radio singer. Included among gadgets are 30,000 volt theft-proof switch, tear-gas bomb release, air speed meter, altitude meter.

Changeable Shoe Heels, Revolving Tray Among New Inventions For Housewives

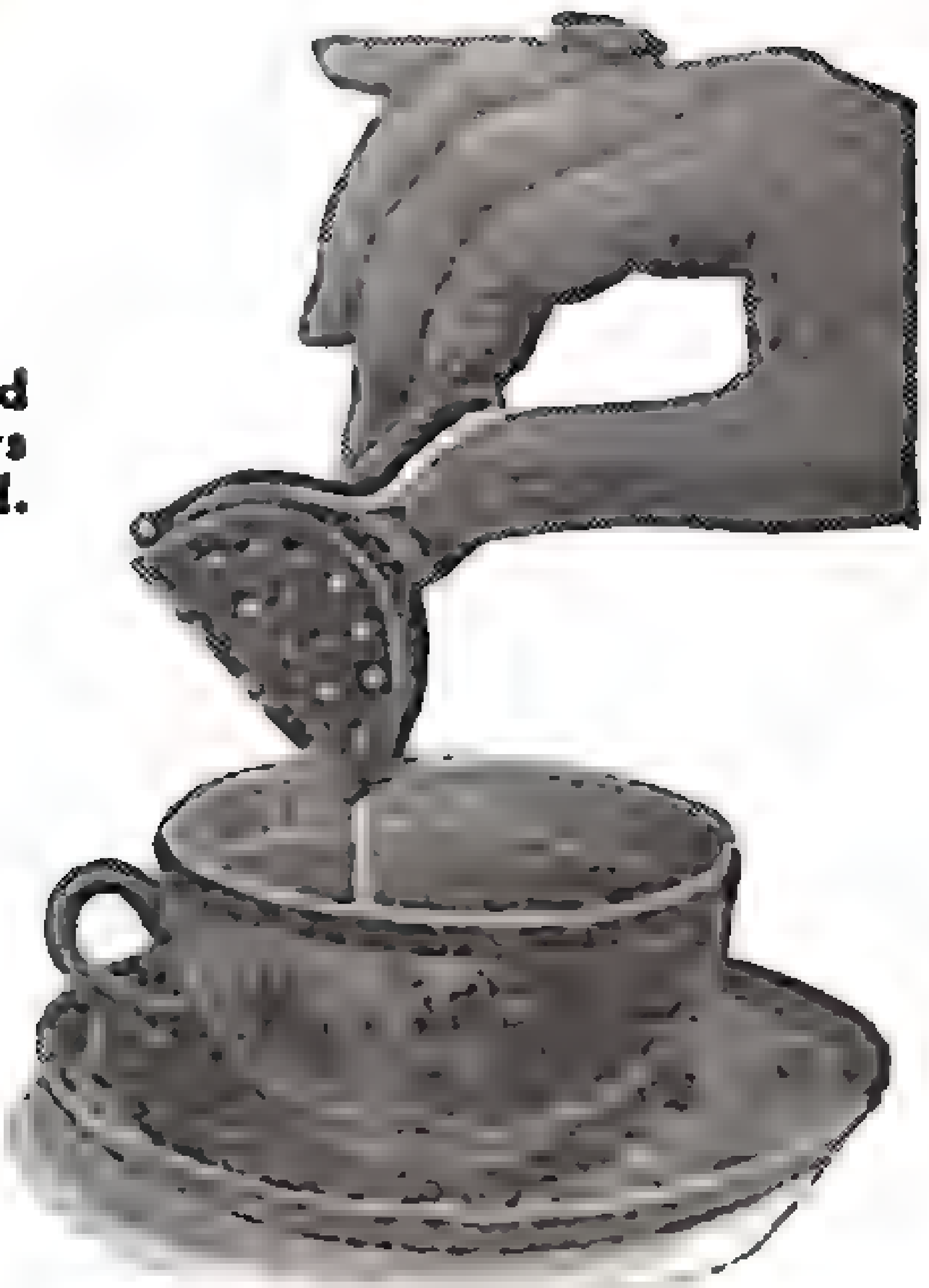
Shoe Heels can now be changed quickly. Replaceable heels sold with women's shoes are pried out with knife and replaced when worn.

Door Knob extension permits doors of closed stairways to be opened without stooping. Device is reversed for top of stairs.

Lunch Tray holds beverages, food, and napkins all at once. Trays are readily separated when handle is loosened.



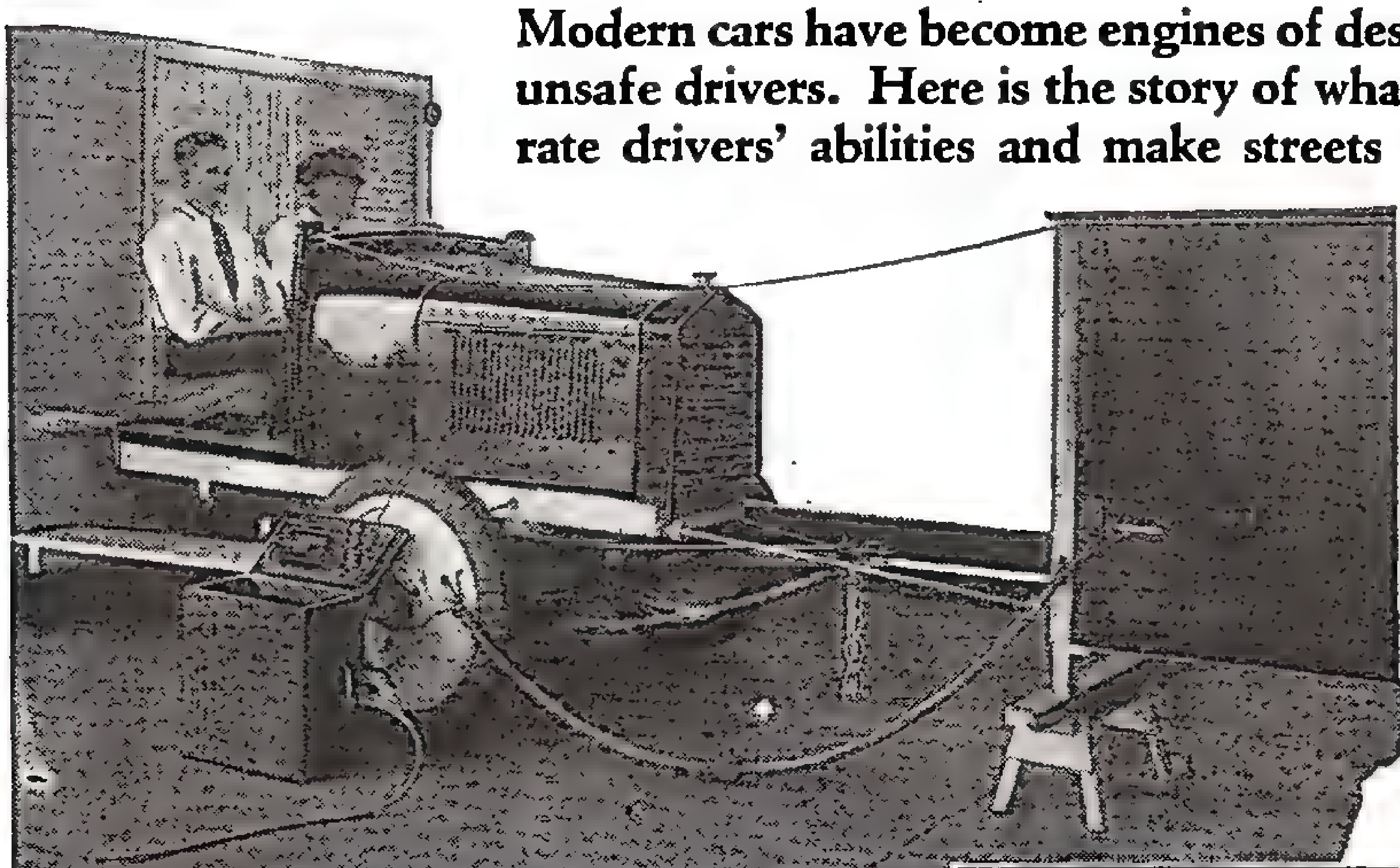
Cooking Thermometer which clips to edge of cooking utensil can be read without removal from dish. Pointer on circular dial indicates exact temperature of food at all times. Danger of burning fingers in handling regular glass type thermometer is thus eliminated.



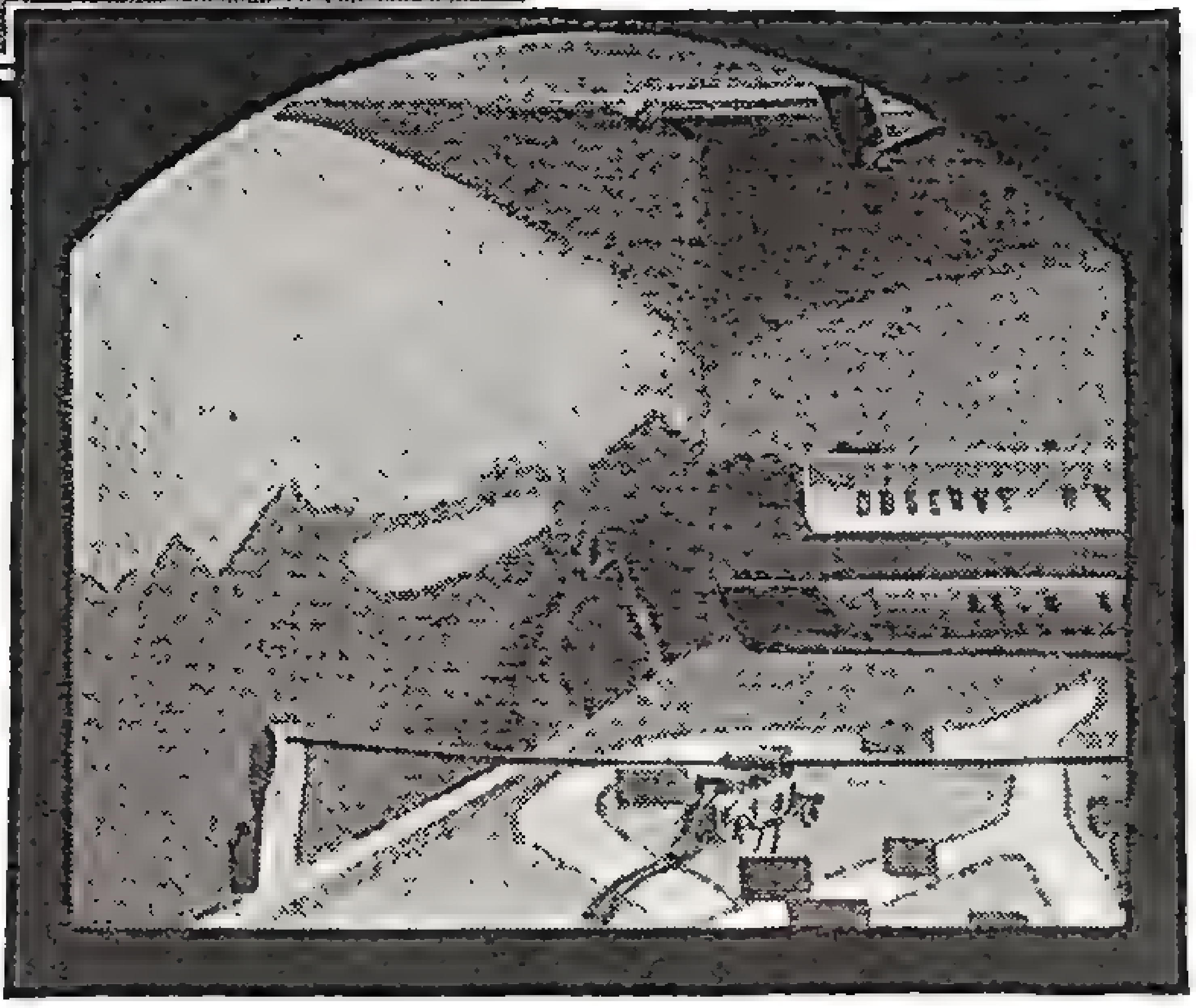
Squeezer served with lemon slice and tea removes all juice. No need to touch fruit with fingers. Juice drains through holes.

ARE YOU FIT *to* DRIVE

Modern cars have become engines of destruction in hands of unsafe drivers. Here is the story of what science is doing to rate drivers' abilities and make streets and highways safe.



Left—Seated at the wheel of a dummy automobile, a subject is taking an all-around driving test, as he faces the miniature stage shown below. Across the front of the stage, a toy car is suspended from an iron bar. The controls of the car in which the driver sits operate the toy car, moving it to left or right as the floor of the stage moves on an endless belt, to simulate passing road conditions. Driver's task is to guide the toy car as if in actual traffic.



by JOHN C. HARPER

THIRTY thousand people—one every fifteen minutes—were killed by automobiles in the United States last year.

During the same period 850,000 others were injured—an amazing average of one casualty every thirty seconds of the entire year.

In the hands of the unsafe driver, the modern automobile has become a terrible engine of potential destruction. Speeds of 80 and 90 miles an hour are virtually standard in all present cars; yet a speed only slightly higher—100 miles an hour—was condemned last year by the rules committee of the Indianapolis Speedway as having "gone beyond the physical limitations of the track for safe driving."

Unsafe Drivers Menace Public

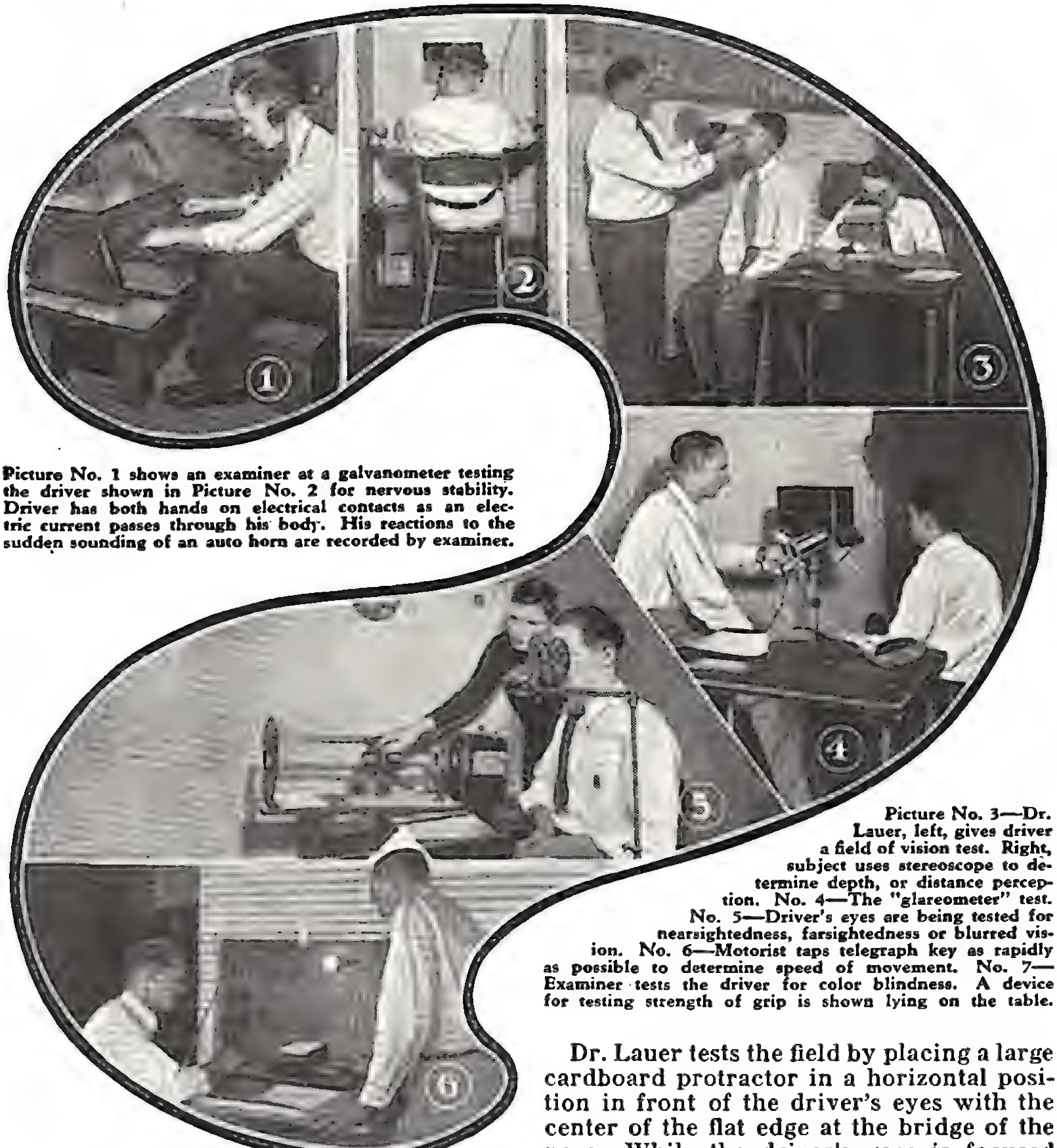
Yet despite mounting casualty lists and high speed warnings men and women unfit to drive continue to roar down the highways headed for disaster. Some of these drivers cannot tell red from green; others see two cars where there is only one; still others become panicky and "freeze" when confronted with an emergency.

To halt this senseless slaughter and stem the casualty flood, Dr. Alvah R. Lauer, associate professor of psychology at Iowa State College, has recently perfected a series of tests which determine, with remarkable accuracy, the limits of a motorist's driving ability.

Dr. Lauer's experiments cover every possible contingency. His "driving dozen" tests the motorist's field of vision, depth perception, ocular dominance, glare resistance, color blindness, length of vision, strength of grip, speed of movement, reaction to noise, motor control, nervousness and general manipulation. In forty minutes he can find out as much about the subject's ability to operate an automobile safely as might be revealed in several years' actual driving.

There is the matter of field of vision, for example. A driver with normal sight may look through the windshield and yet, without changing the focus of his eyes, detect moving objects at either side. This gives him a total field of about 190 degrees, a margin of safety permitting him to watch crossroads and passing drivers. Other motorists, however, have an extremely narrow field, known as "tunnel vision." They see only as much as the normal person might if he were looking through a length of pipe.

AN AUTOMOBILE



Picture No. 1 shows an examiner at a galvanometer testing the driver shown in Picture No. 2 for nervous stability. Driver has both hands on electrical contacts as an electric current passes through his body. His reactions to the sudden sounding of an auto horn are recorded by examiner.

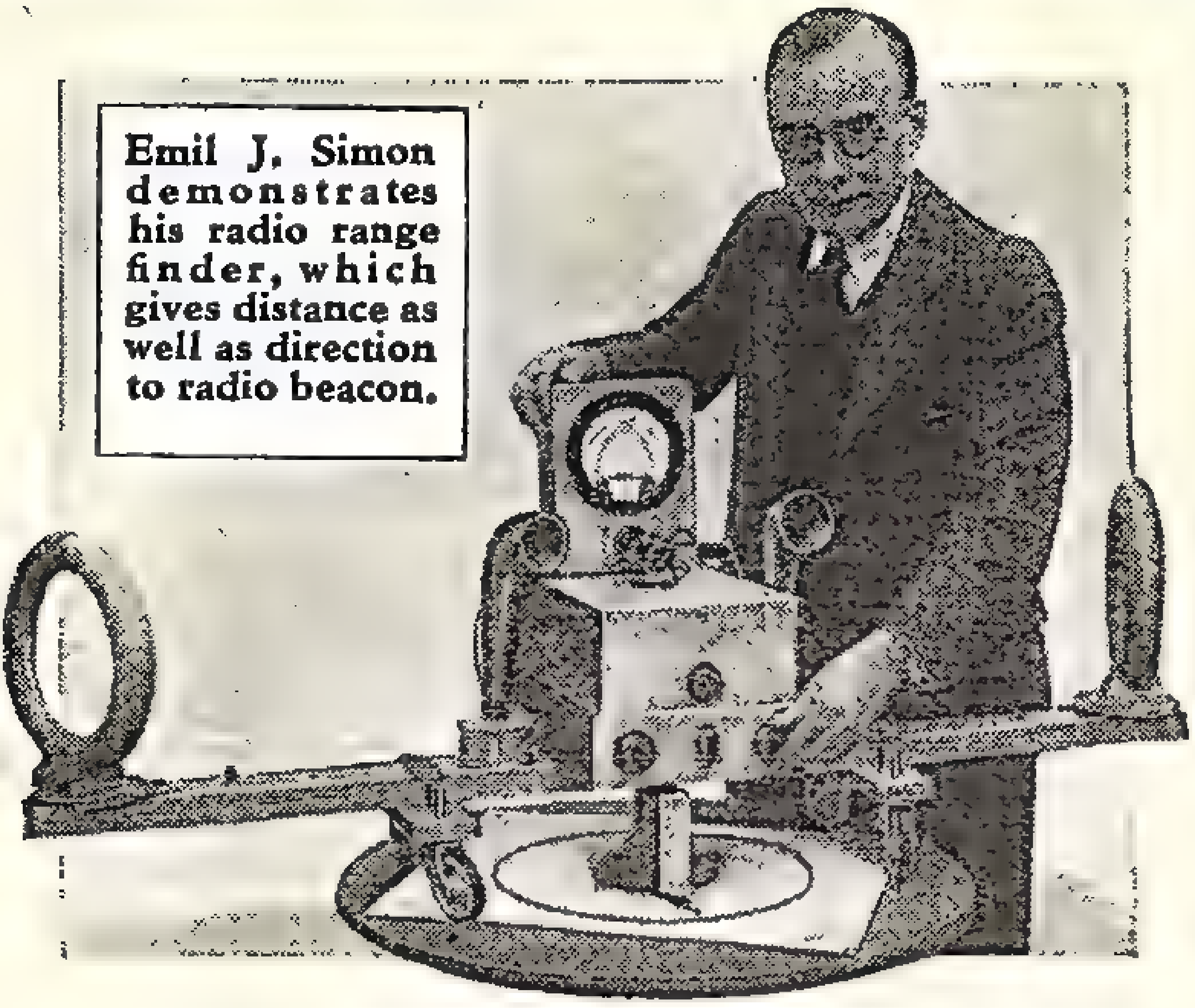
Picture No. 3—Dr. Lauer, left, gives driver a field of vision test. Right, subject uses stereoscope to determine depth, or distance perception. No. 4—The "glareometer" test. No. 5—Driver's eyes are being tested for nearsightedness, farsightedness or blurred vision. No. 6—Motorist taps telegraph key as rapidly as possible to determine speed of movement. No. 7—Examiner tests the driver for color blindness. A device for testing strength of grip is shown lying on the table.

Dr. Lauer tests the field by placing a large cardboard protractor in a horizontal position in front of the driver's eyes with the center of the flat edge at the bridge of the nose. While the driver's gaze is focused straight ahead, a pencil is moved along the curved edge of the protractor from front to back until it passes out of the driver's sight. The points of disappearance on either side give the measurement of the field.

The reader can test his own field of vision in a rough way by focusing his eyes on some object directly in front of him and wiggling his fingers at each side of his head. If he can see them when they are well to the side, he can be reasonably sure that his field is about normal. Dr. Lauer's tests have shown

(Continued on page 121)

Radio Range Finder for Ships Gives Distance, Direction



Emil J. Simon demonstrates his radio range finder, which gives distance as well as direction to radio beacon.

ALL navigators will be interested in a new radio range finder which promises to eliminate sea accidents such as sent the lightship "Nantucket" with seven of her crew to the bottom after a collision with the liner "Olympic."

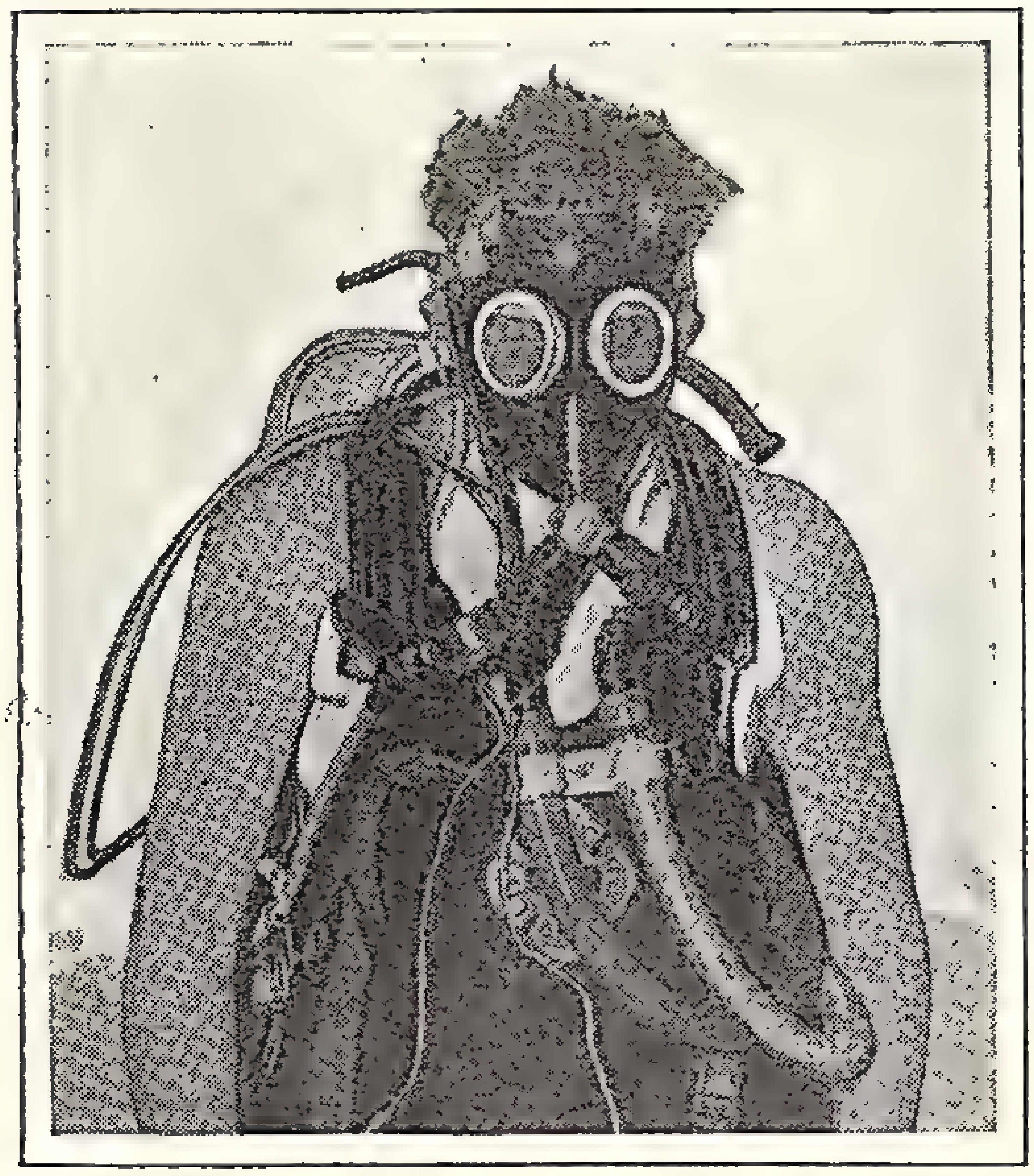
The new radio device developed by Emil J. Simon of New York, automatically and continuously records the distance and direction of a vessel from the radio station or radio beacon to which it is tuned. Present direction finders do not record distance, and must be operated by hand.

Diver Broadcasts Under Water

RADIO is seen as a new aid for underwater rescue work. First tests of a special radio receiver and transmitter unit have been made in the pool of the Park Central Hotel in New York City.

Chain radio broadcasts originating at the bottom of New York harbor, with a diver describing his walk among sunken ships, ocean bottom foliage, and the finny denizens of the deep, are being planned.

Captain Charles B. Scully, who first tried out the device, is enthusiastic over its possibilities for speedy rescue work. The diver, though unhampered by cables, is in constant communication with those above. A microphone and headphones are built into the waterproof rubber mask.



Captain Charles B. Scully with a special waterproof radio transmitter built into diving helmet, just after making successful broadcast from bottom of Park Central Hotel pool.

Giant Film Rolls Make Photo Mural

EASTMAN
Super
Panchromatic
Films

It takes big film to make world's largest photo-mural. Jolieta McCready compares one of rolls used in making of 600-ft. Ford mural with an ordinary small camera roll.

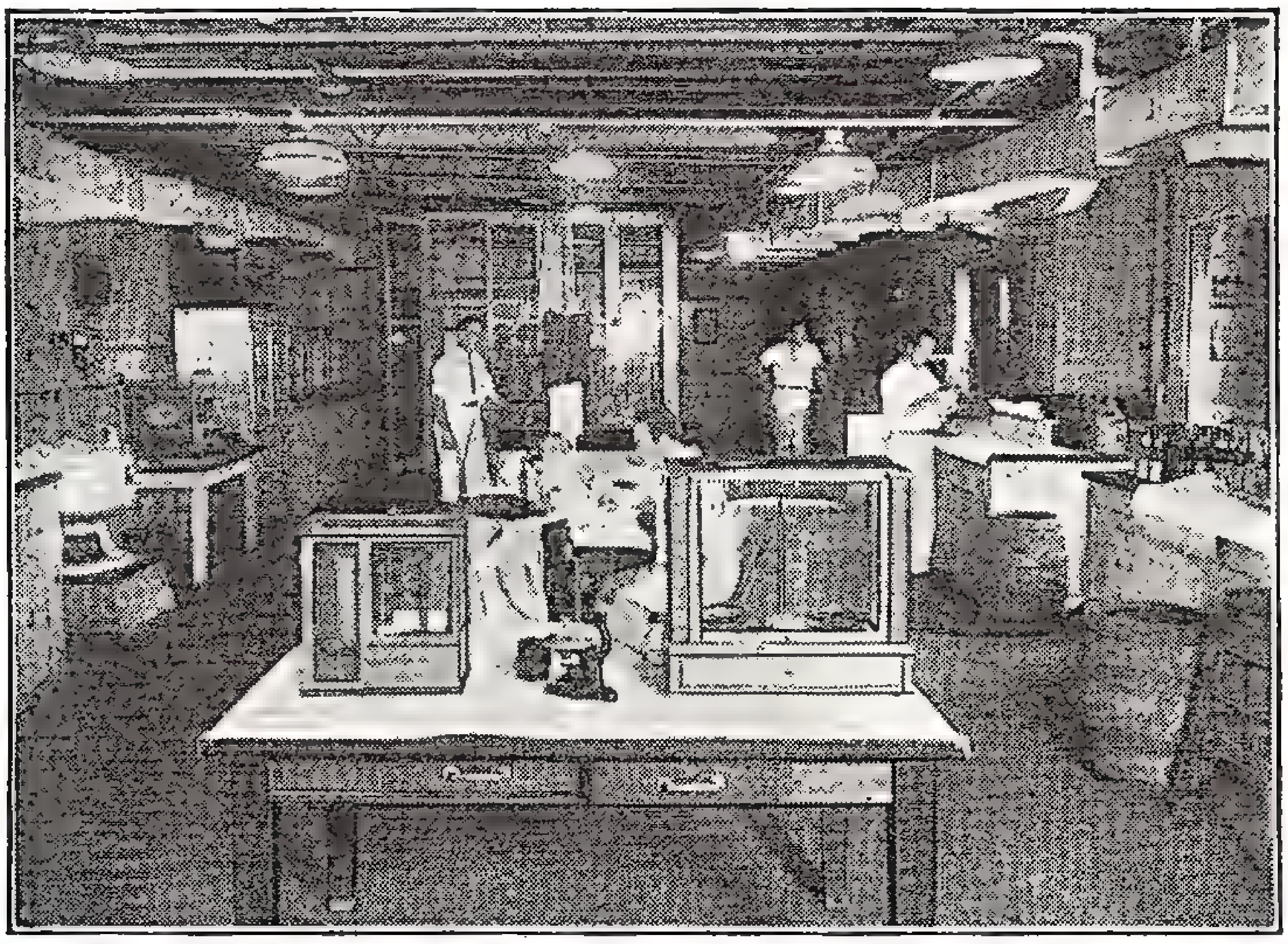
SPECIALLY made giant rolls of film were required for the world's largest photomural, a composite photograph 600 feet long and 20 feet high, presenting the story of the modern automobile in a truly unique manner.

This unusual mural, mounted on the walls of the Ford Building at a Century of Progress, is attracting the admiration of thousands of visitors.

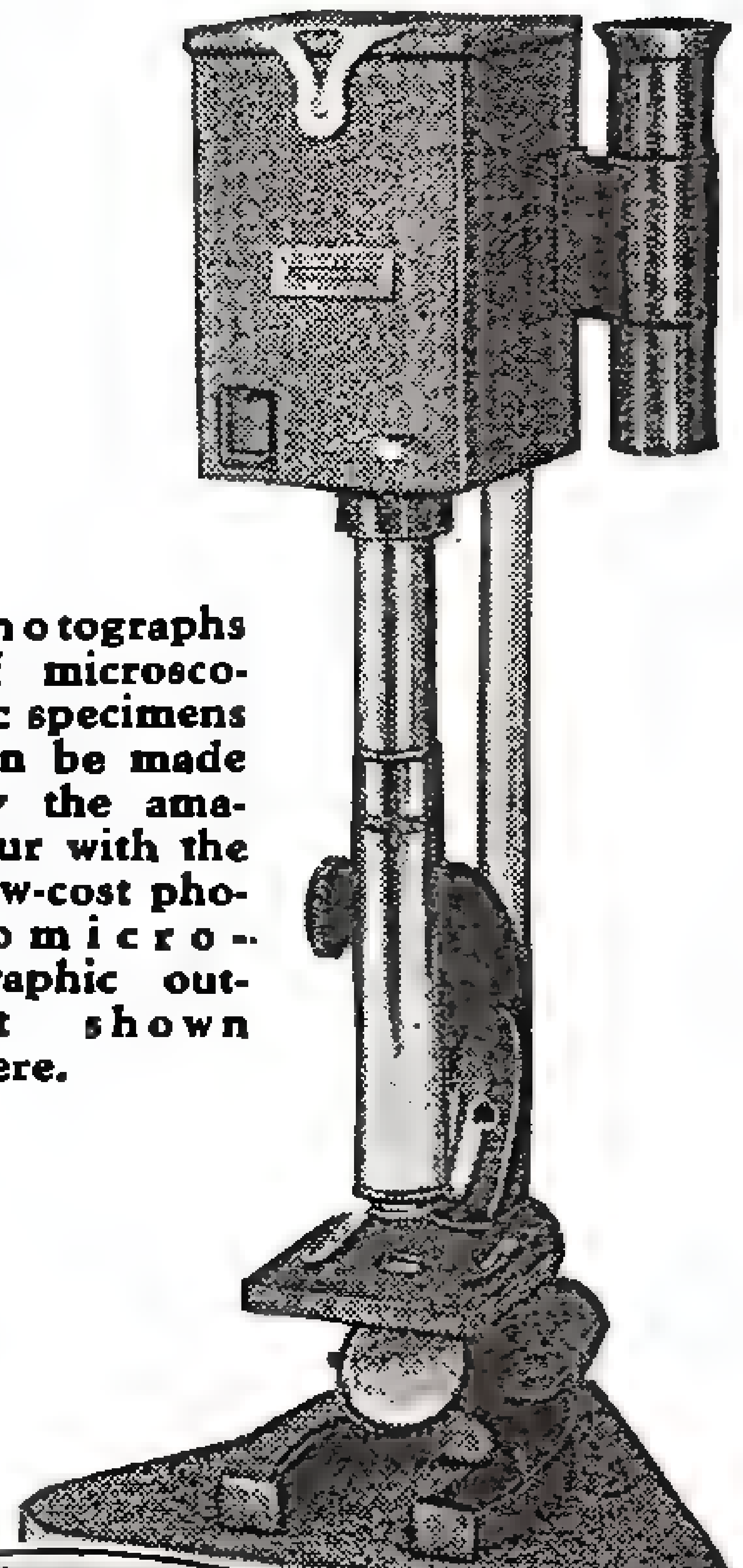
Original 8x10 negatives, taken by George Ebling, personal photographer for Henry Ford, were enlarged many times. The negatives in turn were printed upon huge sections of photographic paper 40 inches wide, and the strips pasted together.

More than a mile of printing paper, 12 tons of steel and thousands of square feet of canvas and wallboard were required.

Microscope Opens New Worlds to Hobbyists



The microscope is one of the most important instruments used to safeguard the health of the public. It determines the standard of quality of food and detects poison and deterioration in fruits, vegetables and meats. It is one of the most powerful weapons used to fight disease. Above is the laboratory of a health department, where foods are studied under microscope.



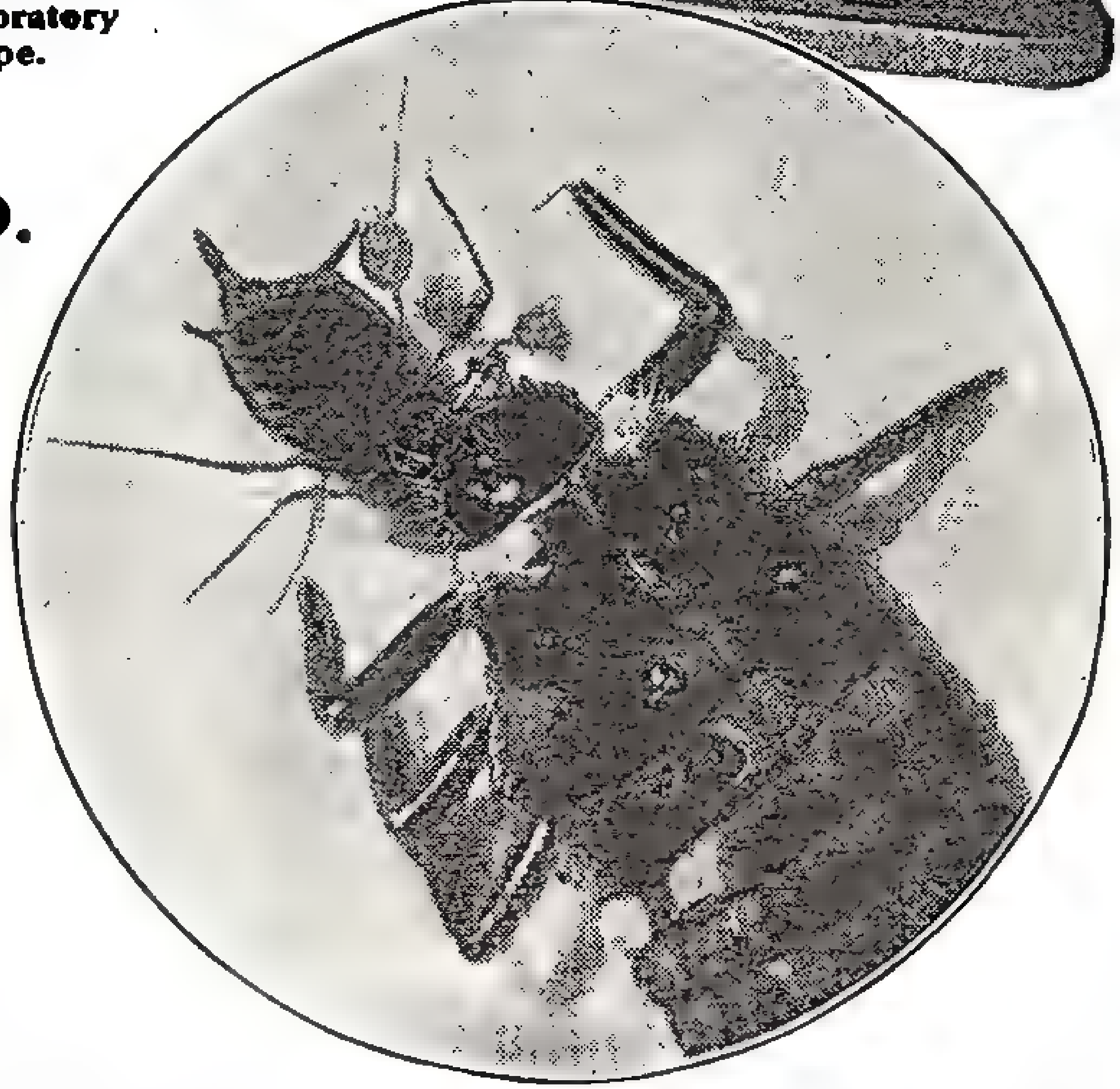
Photographs of microscopic specimens can be made by the amateur with the low-cost photomicrographic outfit shown here.

by
JULIAN D. CORRINGTON, Ph.D.

WHICH one of man's millions of discoveries and inventions is the most important? Someone would be certain to champion the automobile. Whereupon the sponsors of gasoline, steel alloys, electricity, rubber, gears and a host of other entries would point to their choice as being more fundamental. By carrying out this example, it would not be difficult to prove that every prominent invention and discovery is dependent on other factors.

Back of them all, however, is one instrument that is the important guardian of standards of perfection. It is the microscope!

Ordinarily we think of microscopes as inhabiting the remote cloisters of higher learning or as basking lazily underneath bell jars in doctors' offices. But industry, ever alert to seize upon new ideas or draft old ones, has reached out for the principle of magnified vision. From the biological laboratory, where as students they marveled at the intricacy of cell structure or watched the feeding activities of one-celled animals, graduates went forth and found that there was a practical need for the microscope in everyday life and business. They also found unlimited entertainment and instructive use for the microscope around the home and shop. How to combine pleasure with practical value with even the lowest priced instrument is the purpose of a series of articles that will appear here on the use of the microscope.

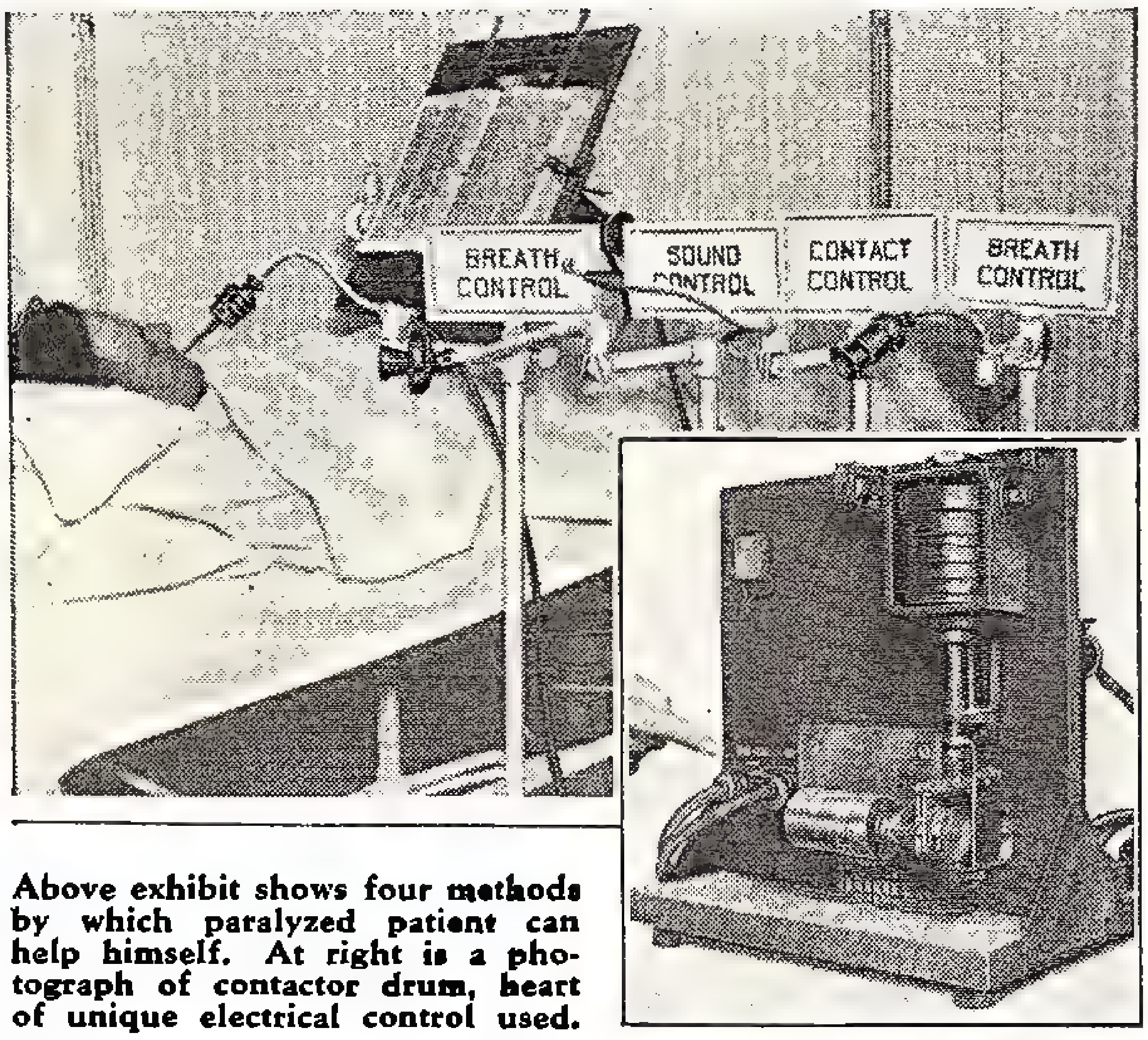


A low power microscope was used to take this photo of a beetle seizing a plant louse with its pincers. Many interesting insect battle scenes can be studied by amateurs with simple microscopes and photomicrographic outfits.

Years of observation and experiment with the microscope put the science of metallography in the industrial spotlight. Now the microscope rules the field and dictates the proper metal or alloy for each new use, measures the grain size of metals, detects impurities and greatly improves product, service and safety. Microscopes are used to detect counterfeit money. Police departments solve major crimes with an instrument that was once frowned upon, except in fiction. Reading glasses and binocular mi-

(Continued on page 133)

Electricity Helps Paralyzed Patient to "Blow" Lights Out



Above exhibit shows four methods by which paralyzed patient can help himself. At right is a photograph of contactor drum, heart of unique electrical control used.

PATIENTS who are unable to move hands or legs can still turn the pages of their books, turn on the radio, operate signal buttons, or turn the lights off. A unique electrical robot with four different methods of control, the secret of the above seeming miracle, was demonstrated recently before noted surgeons in a New York hospital.

Almost human is the uncanny "thinking" mechanism of this device. In one instance an ever-watchful electric eye picks up motions of the patient's head, deducing from the length of the nod whether to turn the radio on or call the nurse. In other systems, the patient blows a tiny pipe, touches a metallic arm with his cheek, or talks into a mouthpiece to operate the robot.

The secret of the device is a contact drum which turns only when the light beam is interrupted. By prolonging the movement of his head the patient can turn the drum to a point which brings the desired unit into operation. An indicator flashes continually as the drum turns to tell its position.

"Asbestos" Man Walks in Furnace

IN A recent test of a new asbestos suit, a man walked into a large furnace and emerged unscathed by the raging flames. A special helmet kept out smoke and dangerous fumes.

The new suit will prove especially valuable in fighting oil gusher fires, and in entering burning buildings to bring out persons overcome by the smoke.

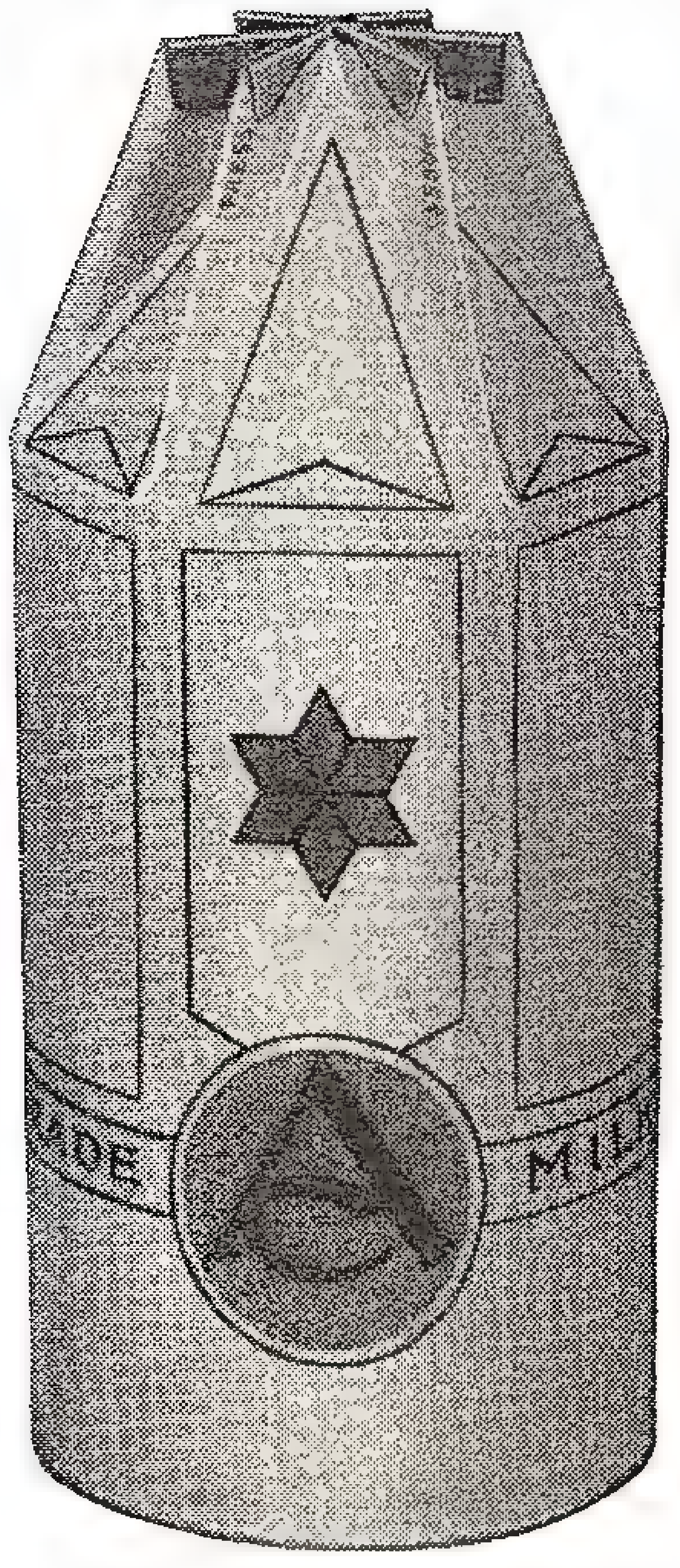
Dressed in asbestos suit like that above, anyone can walk into burning house to rescue persons or recover valuables.

Milk to be Sold in Paper Bottles

A MACHINE just recently developed not only sterilizes, fills, and caps milk bottles, but actually makes the bottles. Everything is automatic, and the filled milk bottle can be turned out at a cost of less than one cent.

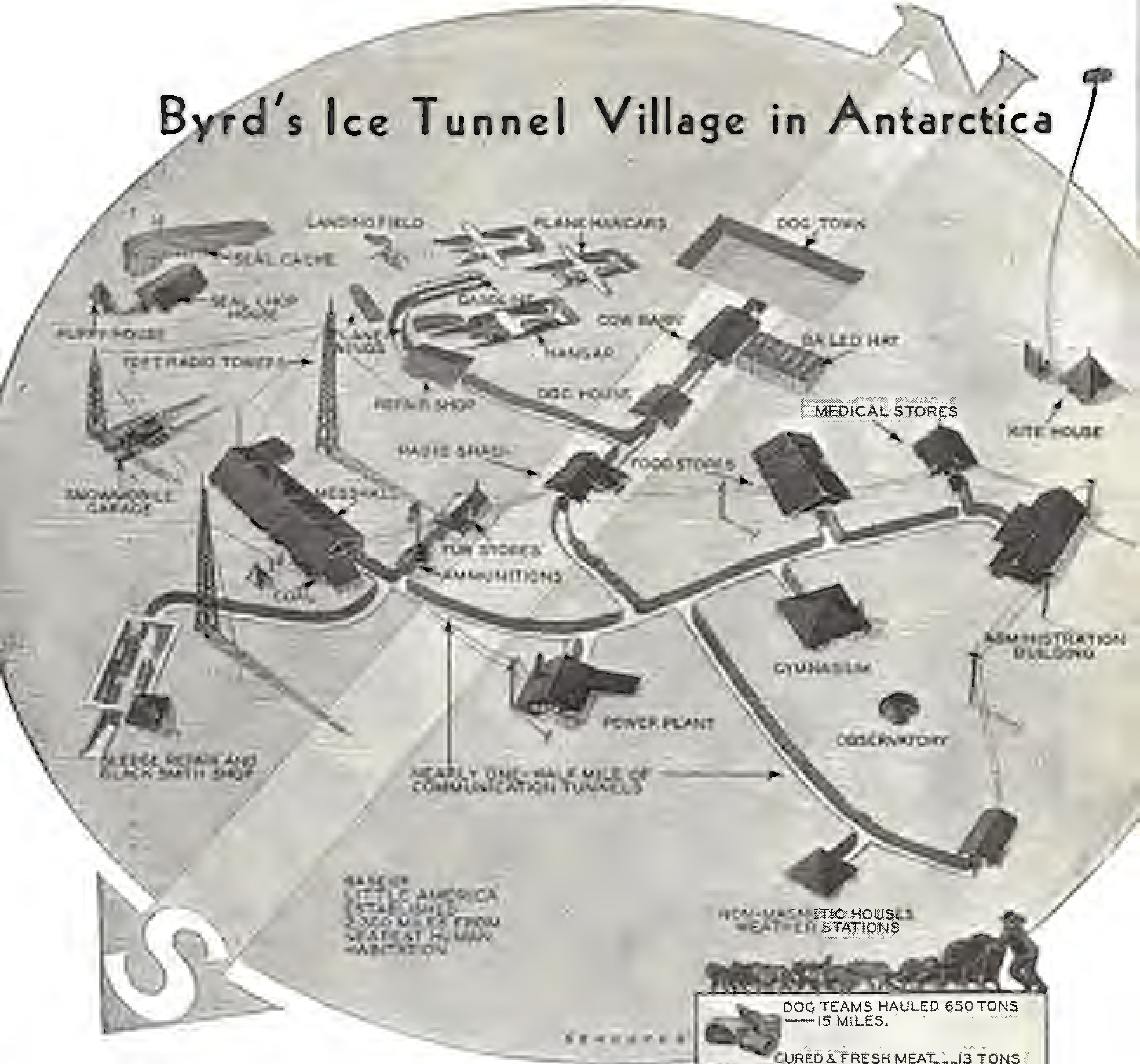
A paper container used for the milk has many novel features. Sturdy construction permits it to be handled just as roughly as the glass bottles, without danger of leakage.

A special clip which seals the bottle is easily replaced if contents are not used at once. Even if the milk freezes, the bottle remains sealed.



New paper milk bottle is so cheap it can be thrown away after use. Top of bottle forms pouring lip.

Byrd's Ice Tunnel Village in Antarctica


LANDING FIELD
PLANE HANGARS
DOG TOWN
SEAL CACHE
SEAL CHOP HOUSE
PUPPY HOUSE
LEFT RADIO TOWERS
PLANE HANGAR
GASOLINE
COW BARN
BALED HAY
HANGAR
REPAIR SHOP
DOG HOUSE
MEDICAL STORES
KITE HOUSE
RADIO SHACK
FOOD STORES
SNOWMOBILE GARAGE
MESSHALL
FUR STORES
AMMUNITIONS
COAL
ADMINISTRATION BUILDING
GYMNASIUM
POWER PLANT
OBSERVATORY
SLEDGE REPAIR AND BLACKSMITH SHOP
NEARLY ONE-HALF MILE OF COMMUNICATION TUNNELS
BASE OF LITTLE AMERICA ESTABLISHED 2,300 MILES FROM NEAREST HUMAN HABITATION
NON-MAGNETIC HOUSES WEATHER STATIONS
S

DOG TEAMS HAULED 650 TONS ——15 MILES.

CURED & FRESH MEAT	13 TONS
CORNED & SALT MEAT	12 TONS
CHICKEN & TURKEY	½ TONS
EGGS	500 CASES
BUTTER & LARD	3 TONS
FLOUR	15 TONS
COFFEE & TEA	3 TONS
COAL	5 TONS
HYDRATED FRUIT	4 TONS
AVIATION GASOLINE	10,000 GALS.

WHILE America swelters in the grip of summer heat waves, Little America, at the other end of the globe, is braving the icy rigors of an antarctic winter night which is four months long.

As shown in the graphic illustration above, only by means of narrow ice tunnels beneath the snow can communication be kept open in Admiral Byrd's South Pole village. Nearly half a mile of these tunnels connect buildings buried to the roof tops.

Fifty-six men live and work in this ice-bound community, snug and warm in their polar dugouts. The community has a power and light plant, radio equipment, movies, repair shops, a library, complete medical and scientific apparatus, a four-cow dairy and a dog-town comprising 122 huskies and 7 pups.

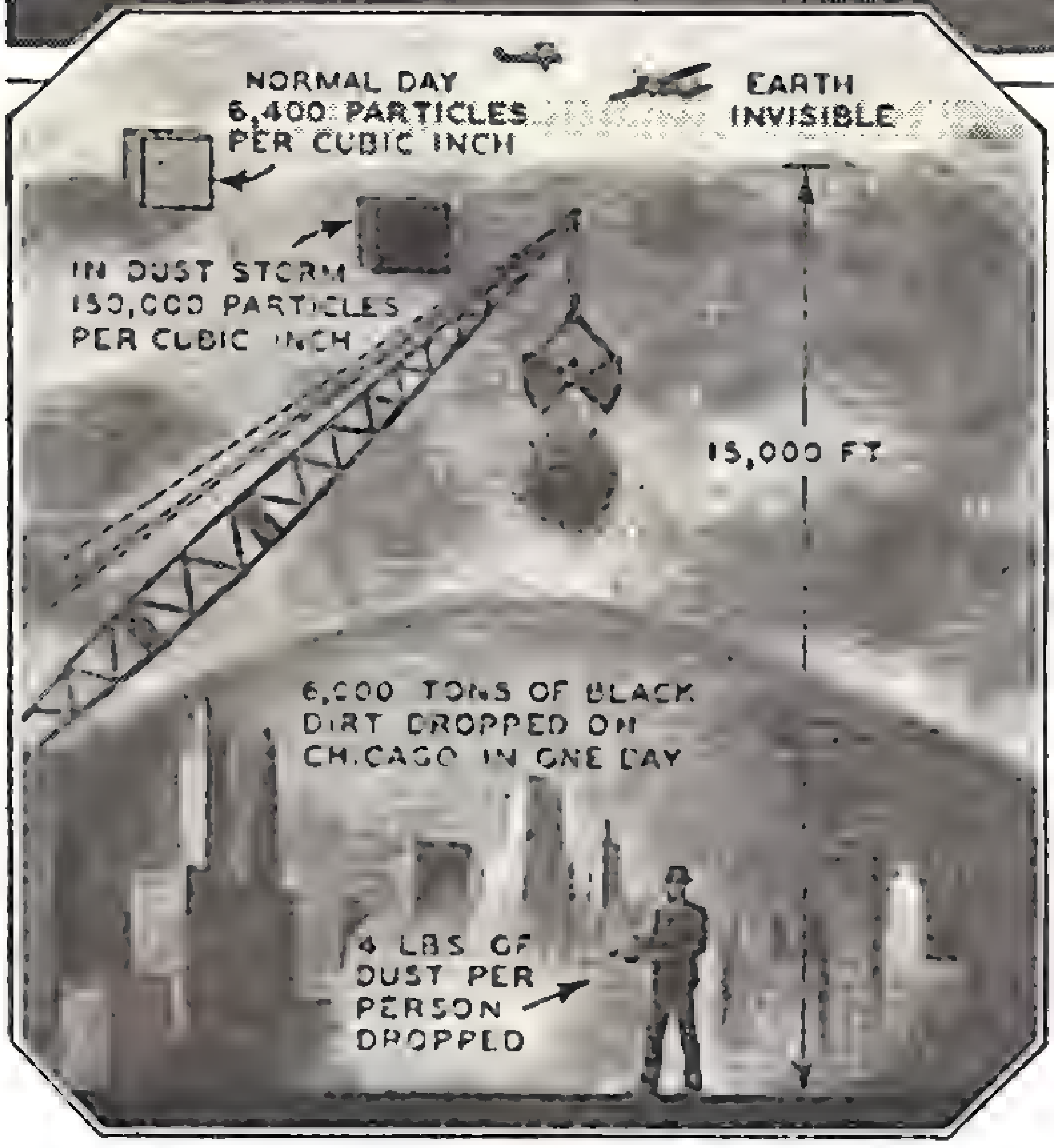
In addition to the regular working crew, a staff of scientists is studying the cosmic ray bombardment, the flight of meteors, thickness of the ice sheet and microscopic life in the Bay of Whales.

Will "*Black* BLIZZARDS"

Dust storms carried away 300,000,000 tons of soil from fertile farms of the Middle West. Drifting sands that remain threaten to destroy this region. Here is a startling story about a storm that cost $2,000,000 a day.

At left can be seen a huge drift of dust that almost covered farm machinery. In some cases the dust drifts were 20 ft. deep.

by
James Nevin Miller


NORMAL DAY
6,400 PARTICLES
PER CUBIC INCH
EARTH
INVISIBLE
IN DUST STORM
150,000 PARTICLES
PER CUBIC INCH
15,000 FT
6,000 TONS OF BLACK
DIRT DROPPED ON
CHICAGO IN ONE DAY
4 LBS OF
DUST PER
PERSON
DROPPED

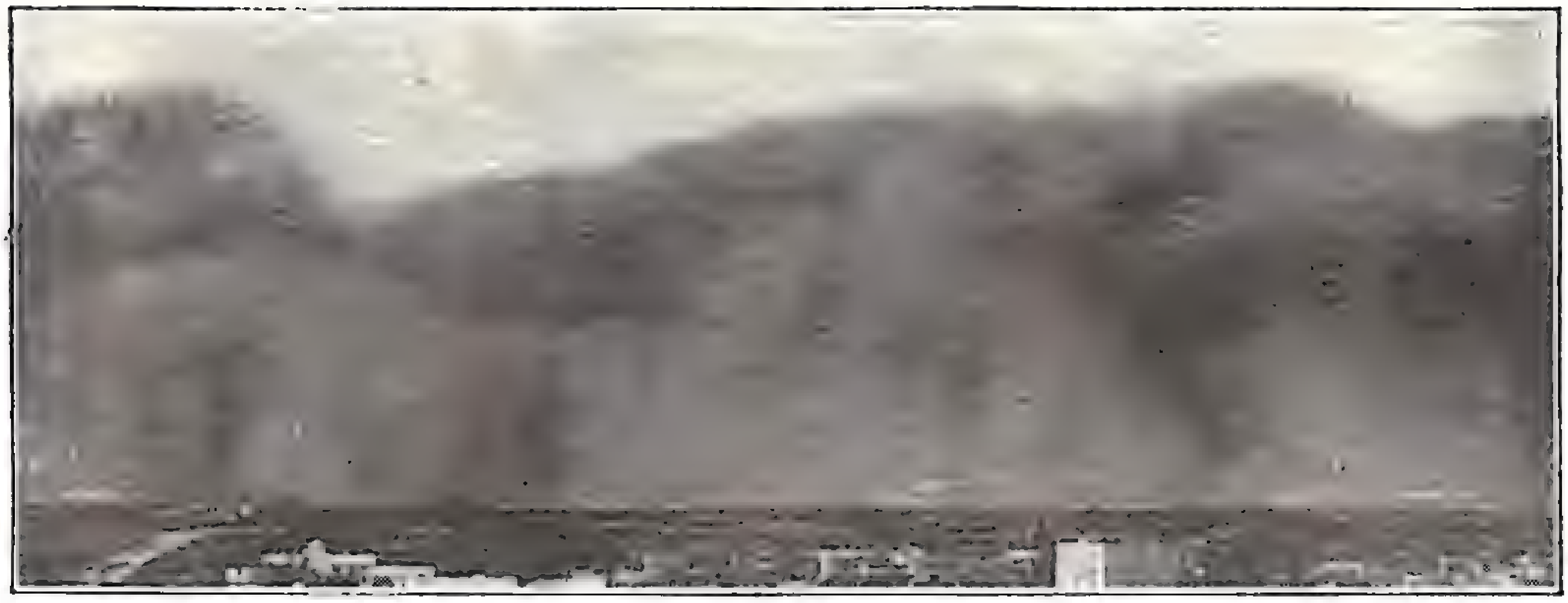
Above are some unusual statistics gathered during the dust storm by the weather bureau. The dust was so thick it drifted into homes through closed windows and in some cases forced cancellation of schedules of transport airliners.

GIGANTIC dust storms sweeping across the United States like "black blizzards" threaten to convert the fertile Middle West into a desert as arid as the Sahara.

In a few days 300,000,000 tons of dust, once fertile soil in regions west of the Mississippi, were whipped into the air by strong gales. The vast cloud, so black and somber that the sun was hidden, had a front 900 miles wide. It originated in the sandy country of Montana, and picked up more soil as it swept over the Dakotas, Minnesota and other midwestern states.

The "black blizzard," two miles high, continued on across the United States dropping its load gradually as it moved out over the Atlantic.

The storm was a devastating climax to a 28 day drought. Wheat farmers in the fertile Great Plains areas lost an estimated $2,000,000 a day as vegetation burned. Countless cattle in parched fields sickened and died as dust blanketed pastures. In-



This exceptional view, taken by a weather bureau photographer, shows the dust storm sweeping down on a city in the Middle West. The cloud was 900 miles wide and moved 1,800 miles across the U. S. and on into the Atlantic ocean.

MAKE U. S. *a* DESERT?

The "Black Blizzard" engulfing a midwestern city is strikingly shown here. The cloud completely shrouded the sun forcing automobile drivers to abandon their machines.

numerable young plants, notably wheat and corn, were literally blown from their base, causing severe crop damage.

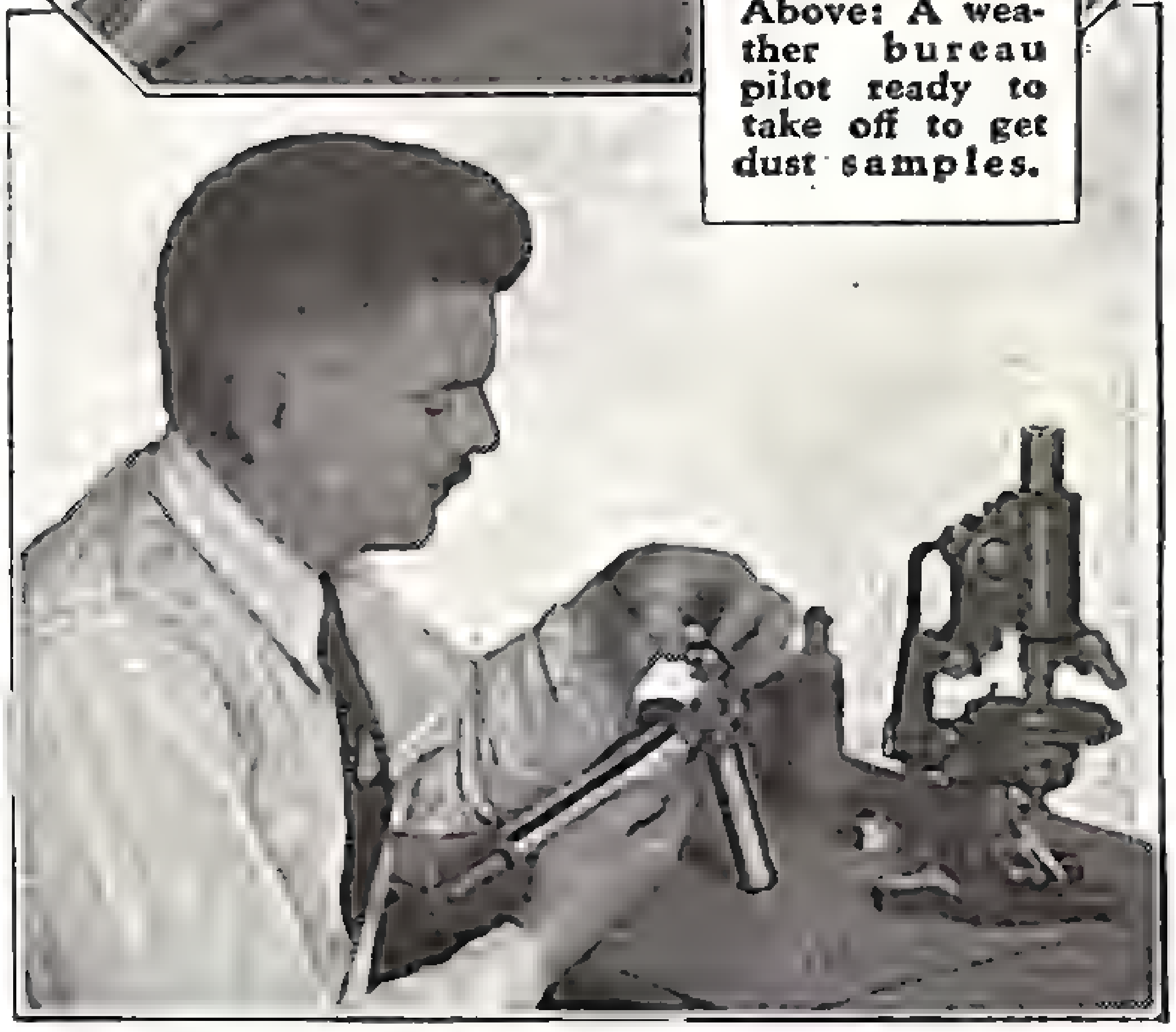
The storm, Dr. W. J. Humphreys, of the Washington Weather Bureau, said, originated in the bare land of the Great Plains states that had been pulverized by cultivation and dried by severe drought. Violent gales swept this powdery soil up in a huge cloud.

Experts point out that man's attempts to cultivate dry lands in the far west threaten to convert the states west of the Mississippi into a vast desert. Formerly the loose soil and sand was held in place by wild grasses. Plowing under of this grass exposed the light earth to the constant winds.

The erosion is becoming so severe it is feared that within a few years the poor soil that remains will not support any type of vegetation. Investigation shows that the wind carries away the light, fertile soil, leaving the coarser sand to drift across the land. This sandy soil will not hold water and unless steps are taken there is danger that the vast region will become a desert.

Recent discoveries indicate that the Sahara was once a fertile country. Whether it was doomed to be an arid desert by dust storms is not definitely known, but records show that Europe has been swept for centuries by "black blizzards" originating in the Sahara.

Above: A weather bureau pilot ready to take off to get dust samples.



Irving F. Hand, U. S. Weather Bureau aerial observer, is shown examining dust which he collected in his suction instrument. It showed 25,000 times more dust in the air. The dust particles were found to be twice the usual size.

$50 *Prizes for* "LIFE IN ICE" LETTERS

Photographer claims Canadian scientist hypnotized, then froze man in ice for 28 days. Above photo taken 12 hours after subject was placed in water-filled coffin and refrigerator turned on, shows ice crystals formed on face.

The 14th day. Subject encased in solid block of ice. Electrical instruments record heart action, according to photographer who took pictures.

Above: On 28th day ice was broken away from frozen subject with heavy hammer. Awakened from hypnotic trance; patient was said to be in perfect health, but ravenously hungry. Left: Apparatus claimed to have been used by scientist to freeze man for 28 days. Hypnotized patient was carefully lowered into water and instruments attached.

CAN a person be hypnotized, frozen in a block of ice for a month, and come through the ordeal alive? Will the heart keep on beating when hundreds of pounds of ice chill every muscle, every drop of blood in the body?

You think it possible? In 250 words or less tell why, and you will be eligible for these prizes: 1st $10, 2nd $5, and four third prizes of $2.50 each.

You think it can't be done—that the

(Continued on page 133)

Baby Goes A-hiking With Mother in New Kiddie Carrier

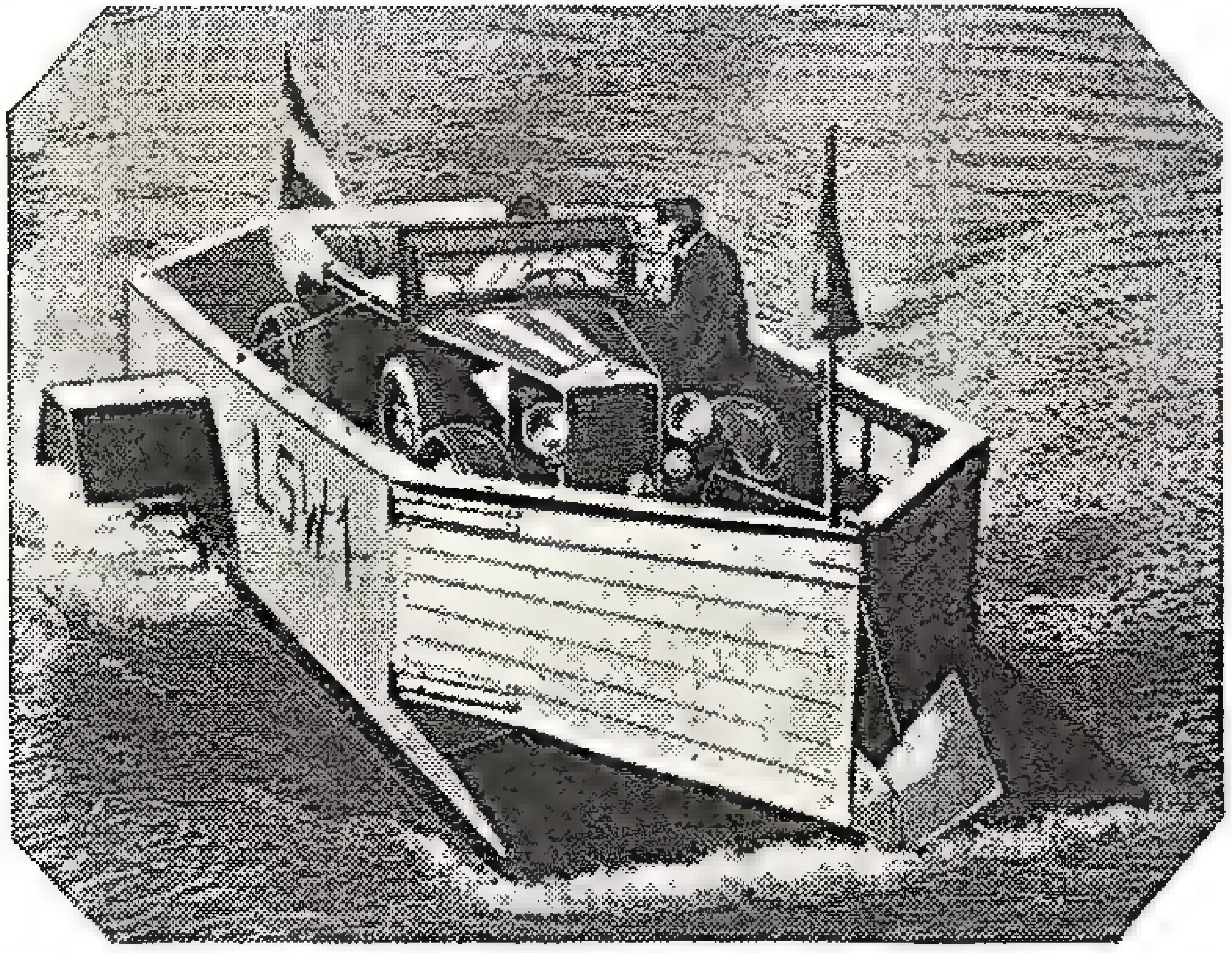
ATHLETIC English mothers who long for a jaunt over the breeze-swept moors and uplands no longer need deny themselves the joys of hiking because toddling youngsters demand their presence at home.

With a new device recently on view at the Camping Exhibition in the Imperial Institute, London, England, the modern mother simply straps the child to her back and sets off on a hiking holiday.

Known as the "kiddie carrier," the device consists merely of a comfortable seat, supported by a steel frame, slung knapsack-fashion over the shoulders. Broad straps permit free use of the arms and are adjustable so that the child's weight may be distributed to afford maximum comfort for the hiker.

A strap may be used to prevent over-frolicsome babies from tumbling off backwards.

Car Propels Ferry by Own Power



Stopped directly above a series of rollers connected with the paddle wheels, this car furnishes its own motive power.

MOTORISTS along the Amersee river in Bavaria furnish their own motive power when they board a ferry to cross the stream.

The car is driven onto a scow-like craft and stopped immediately above a series of rollers. These, in turn, are connected with twin paddle wheels at the sides of the ferry. When the engine of the car is started the traction of the rear wheels turns the rollers causing the paddles to churn the water. A slightly inclined ramp at the bow bridges the gap between ferry and landing stage.

Message Girds Globe in 3 Minutes

A NEW long distance record for cable and wire communications was recently established when a test message was flashed from New York City around the world and back to its starting point in 226 seconds.

Relayed by cable and wire for 25,000 miles, the message flashed across continents at a speed of about 6000 miles per minute.

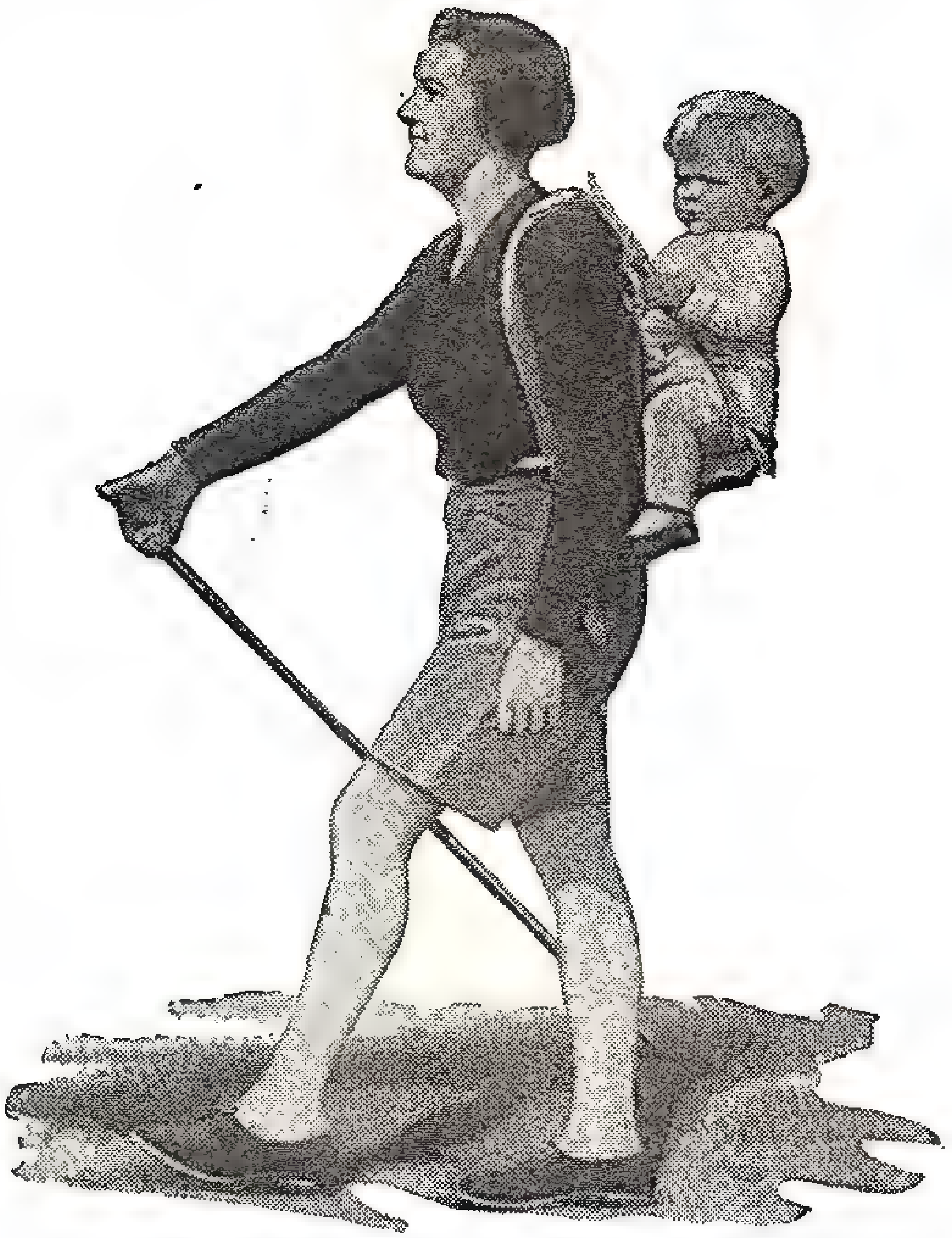


Photo shows ingenious device, patterned after knapsack, which permits mother to take child on hiking excursions.

English Bike Is Built for Three

SONG writers who once extolled the joys of a bicycle built for two must now revise their lyrics with the appearance in England of a tandem bike which boasts a side car for junior members of the family.

The invention of an English cyclist, the side car attaches to the frame of an ordinary tandem bicycle and is sufficiently roomy to accommodate a small child in comfort.

The spring-mounted sidecar is attached directly to the axle of the rear wheel.

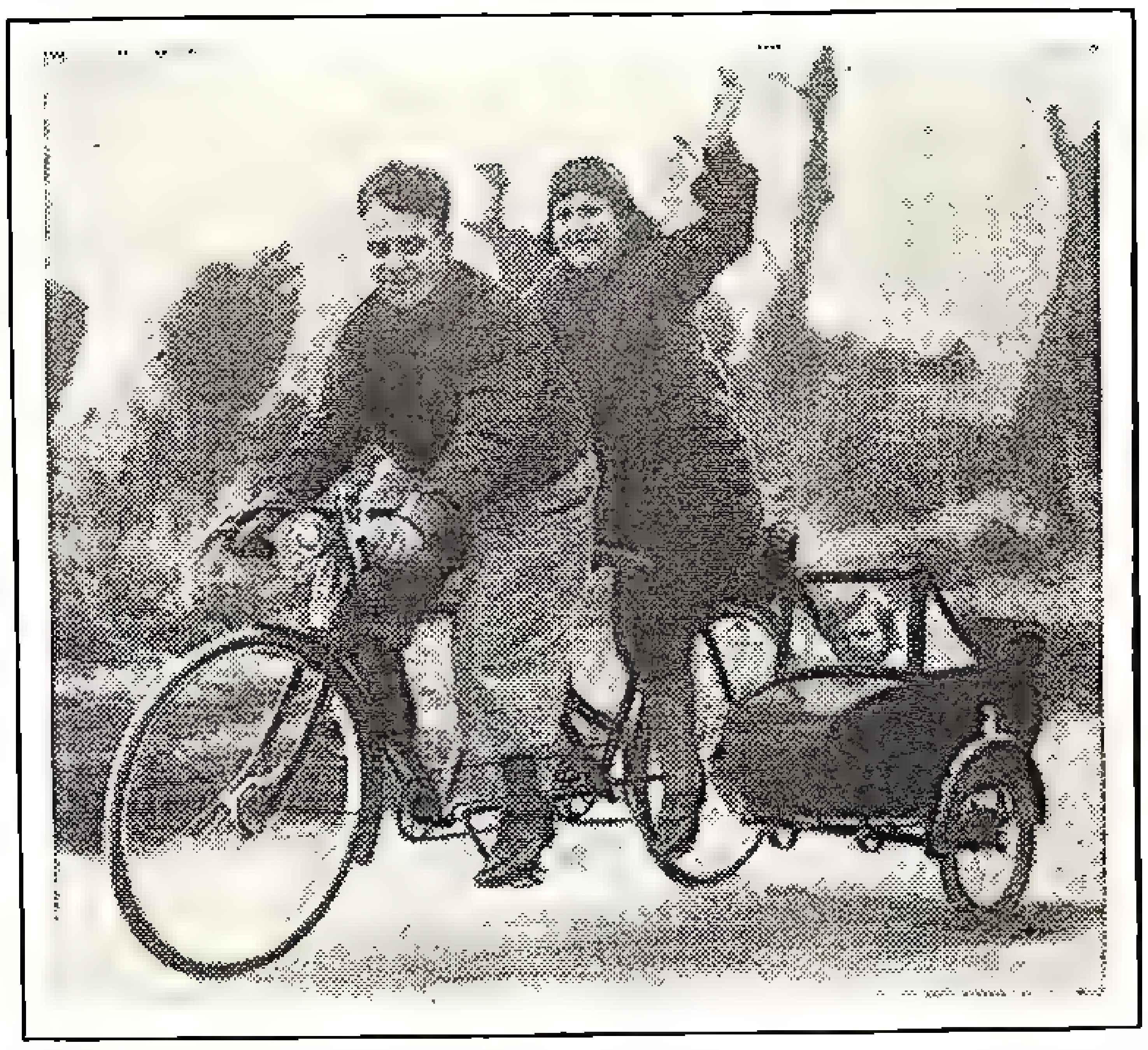
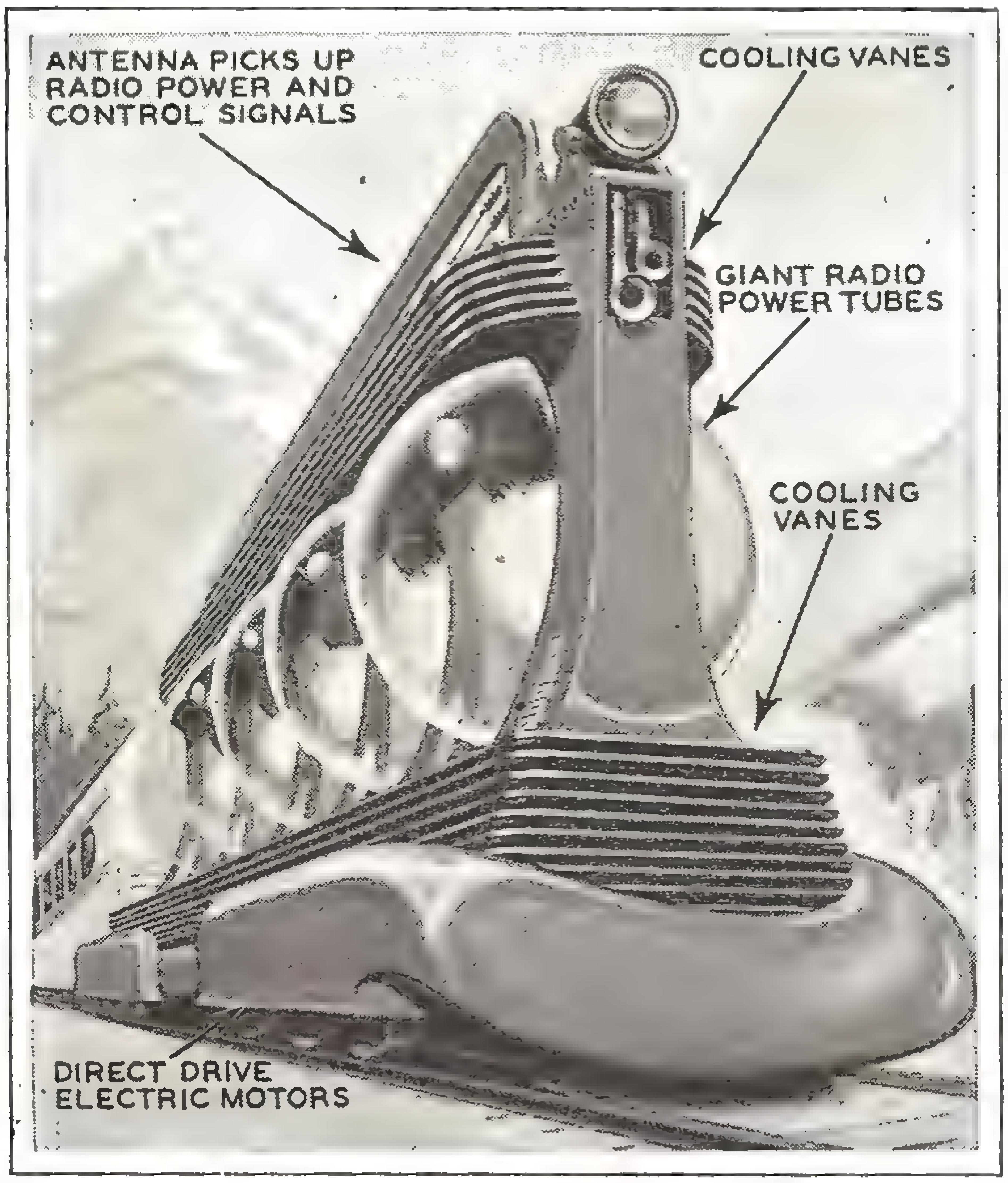


Photo shows a family bicycle tour in England. Note windshield on side car which protects the child from draughts.

Radio Tube Train Gets Power from Air


ANTENNA PICKS UP RADIO POWER AND CONTROL SIGNALS
COOLING VANES
GIANT RADIO POWER TUBES
COOLING VANES
DIRECT DRIVE ELECTRIC MOTORS

This design for a radio powered train was suggested by an electrical engineer. Radio impulses would supply power and control train eliminating necessity of a pilot.

TRANSMISSION of power by radio will result in some radical changes in industry, especially in the field of transportation.

Recent experiments with railroad handcars run by radio suggested the design for a radio tube locomotive shown on the left. The electrical engineer who conceived the unusual power plant claims that such a locomotive could be controlled without a pilot.

The body of the locomotive would be surmounted by a series of huge radio rectifier and receiving tubes. The gigantic tubes could be built of unbreakable glass. Vanes running the full length of the car above and below the tubes will radiate excess heat and prevent the red hot electrodes from melting.

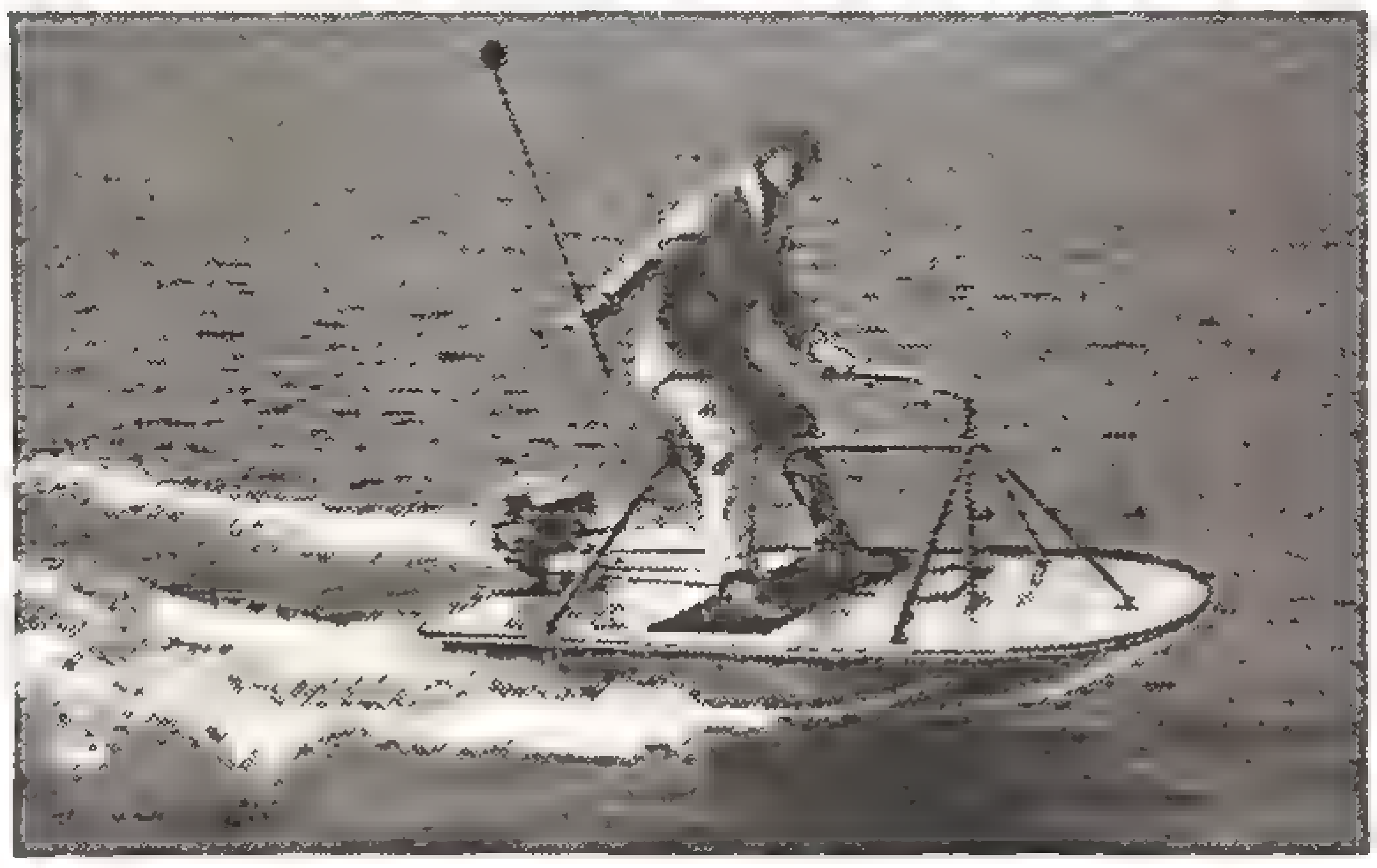
Electrical power impulses from a hydro-electric generating plant would be picked up by the antenna, rectified, and transmitted to the motors. Radio impulses could also control the train.

Aerial Ferry Carries Automobiles

SPANNING the Colorado River near Searchlight, Nev., is the only aerial ferry in the world for transporting automobiles. Forty miles down river from Boulder Dam, the ferry completes a short cut between Kingman, Ariz., and Boulder City. A 25 h.p. gasoline engine is mounted on the upper deck where the operator rides. The ferry carries three tons and makes the 640-foot trip across the river in 2½ minutes.

Eight cables above and two below support this aerial automobile ferry. A gas engine on upper deck operates it.

Outboard Bike Used in Water Polo



This water steed develops 18 to 25 miles an hour and is controlled by one hand. It was designed for water polo.

A SEA-GOING mount has been designed for the exciting sport of water polo. The boat is controlled by the player's left hand so that the right is free to swing the mallet.

The rider sits comfortably in a motorcycle saddle and controls the speed and direction with a special motorcycle hand grip on the steering bar. The boat has a speed of 18 to 25 miles an hour. The hull is a watertight pontoon, with a rubber bumper all around it. The boat is propelled by an outboard motor.

German House Built of Steel Hoops Is Earthquake-proof

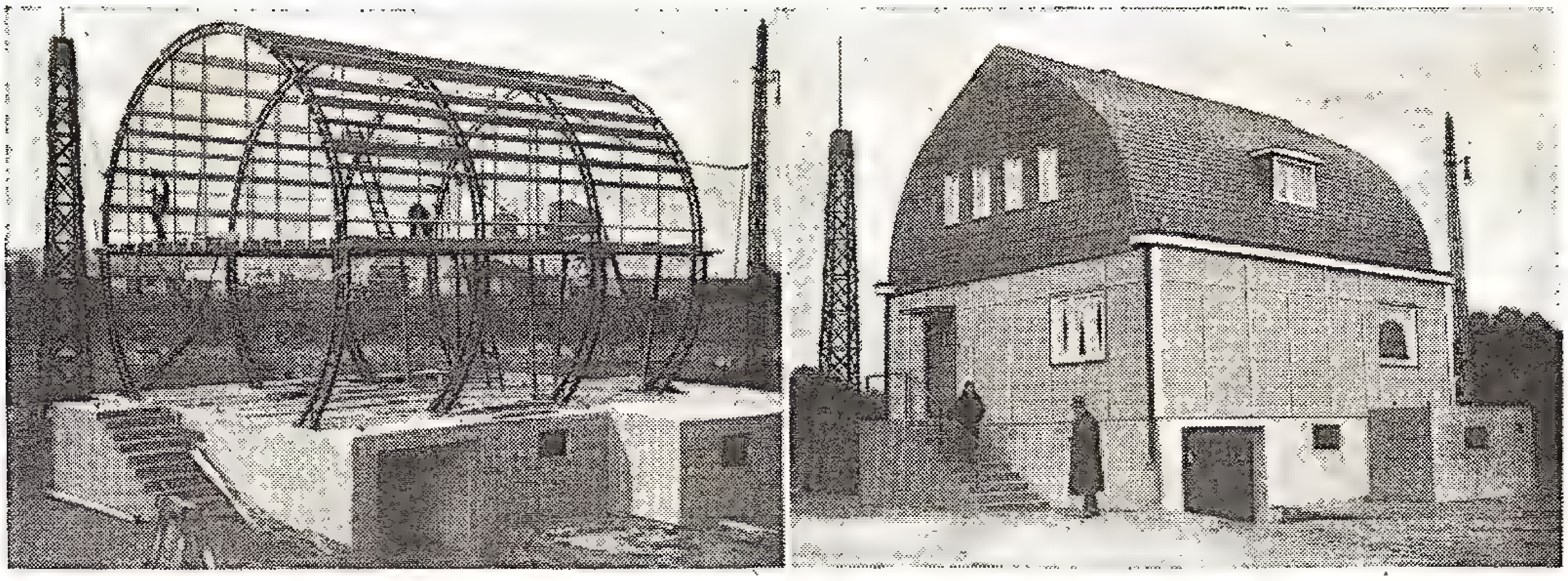


Photo at left shows the early stages of the construction of a novel house in Dusseldorf, Germany, whose framework is composed entirely of a series of huge steel hoops. Right, the completed house, showing simplicity of style.

WALLS, pillars, wooden props, iron and concrete are eliminated in a new "steel hoop" house recently erected in Germany.

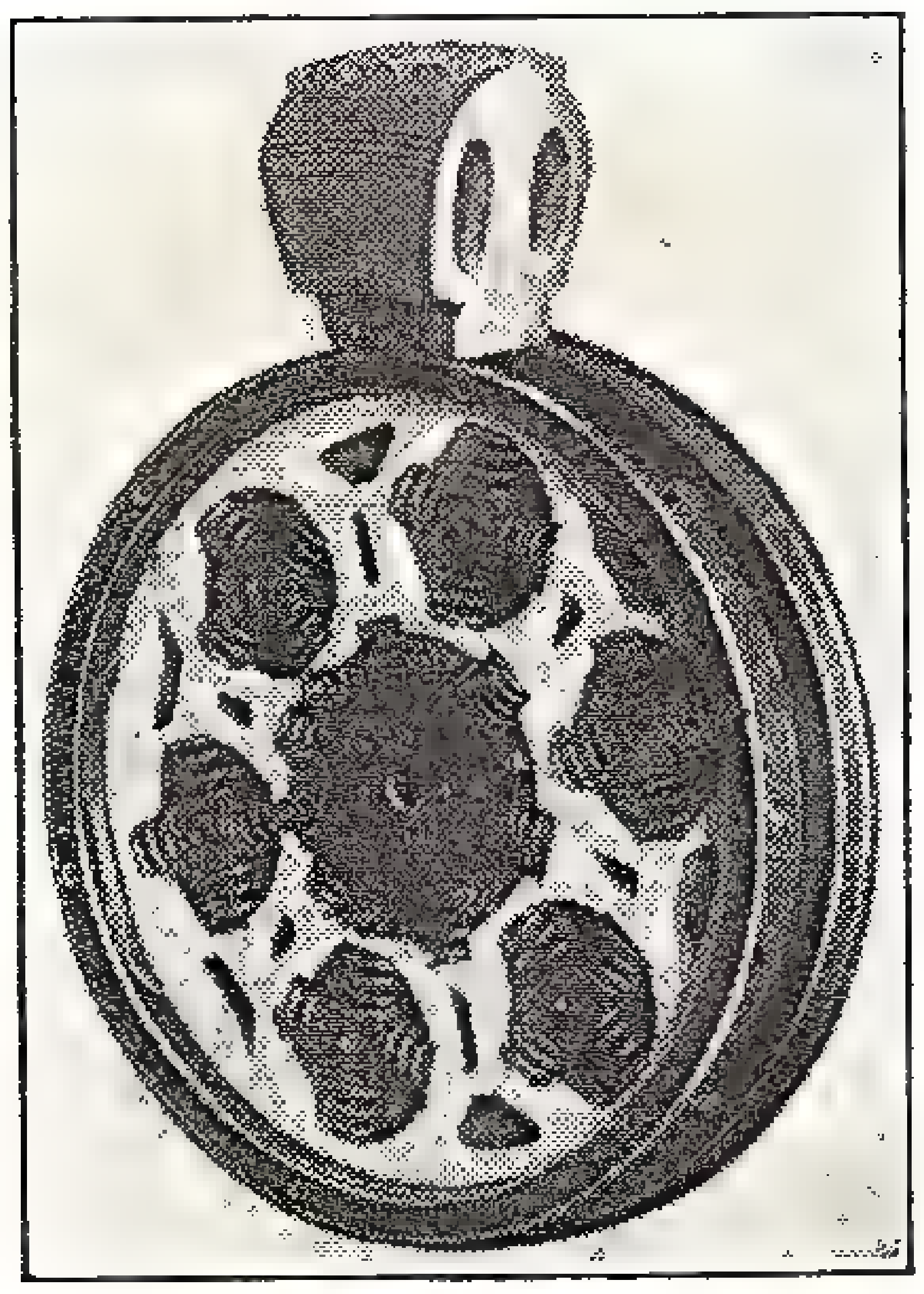
Builders contend that this method of construction places less weight upon the foundation, reduces vibration and hence lessens the dangers of earthquakes.

The only supports are a series of huge steel hoops which bear the entire weight of the structure.

Numerous other advantages are claimed for the new structure. Its simplicity permits building in a few days. The absence of interior walls conserves space and the houses are said to be easily transported from one place to another.

The hoop framework is so completely covered by the walls and roof that the entire unit is very little different in appearance from an ordinary home.

Wheel Springs Absorb Auto Bumps



Powerful springs set under heavy pressure absorb road jars in this new auto wheel.

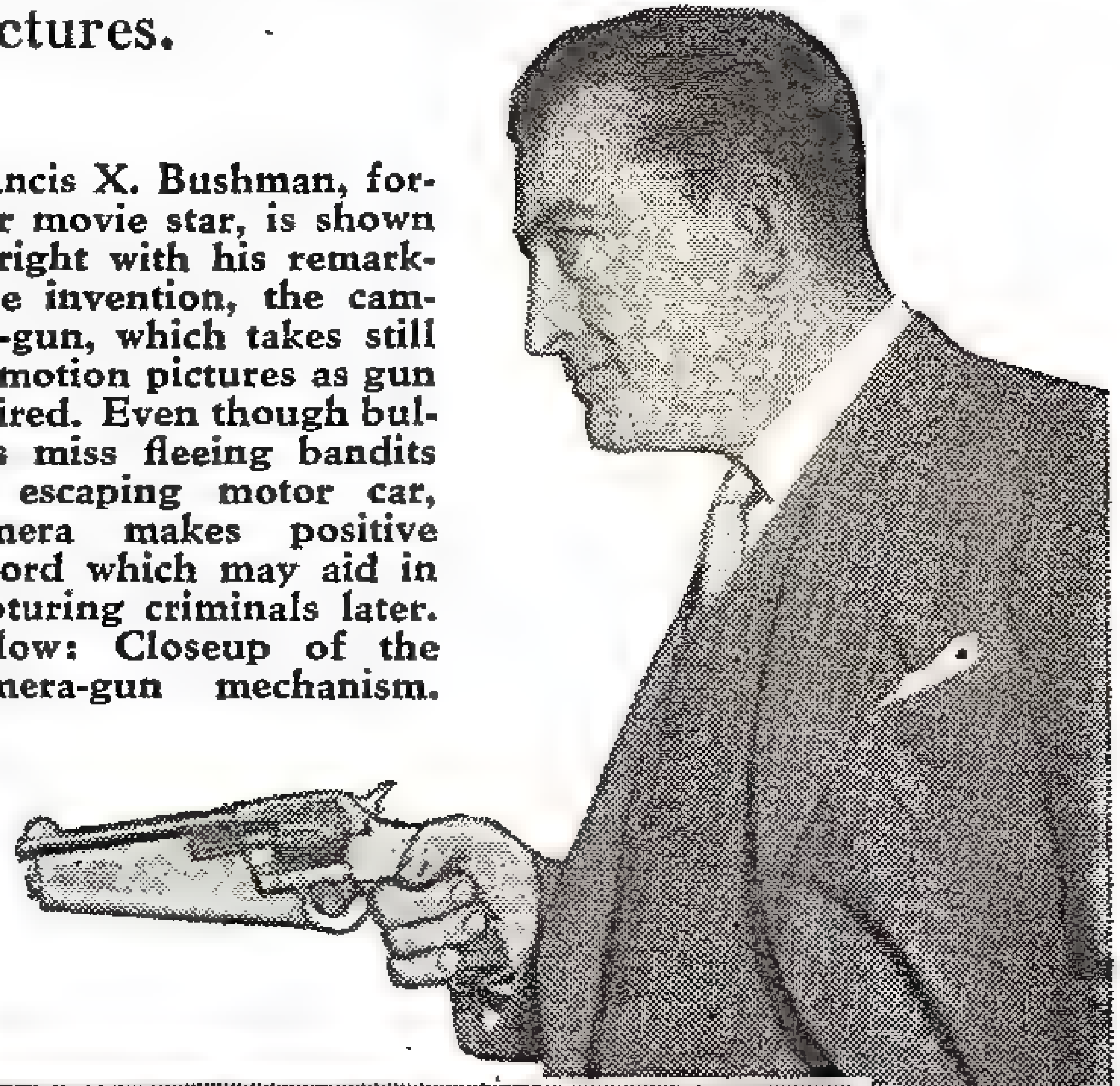
DESIGNED for use with a non-pneumatic balloon tire, a new shock-absorbing wheel is said to combine easier riding with lifelong qualities.

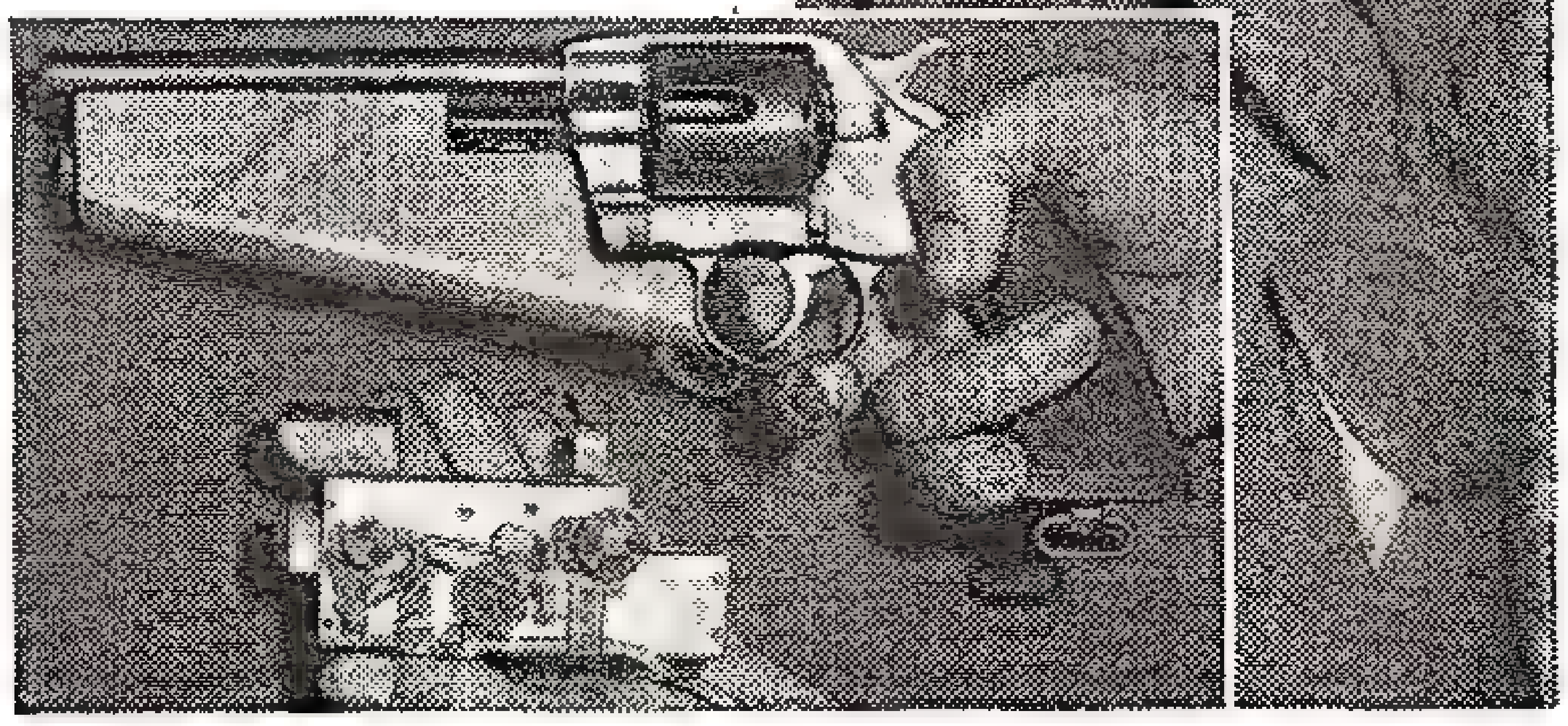
The wheel consists of powerful springs set under heavy pressure, arranged so that all shocks are absorbed within the wheel itself. In operation, all springs bear equal parts of the load.

Camera-Gun "Shoots" Pictures

A NEW camera-gun that takes still or motion pictures simultaneously with the firing of the pistol or rifle to which it is attached is the latest weapon available in the war against crime.

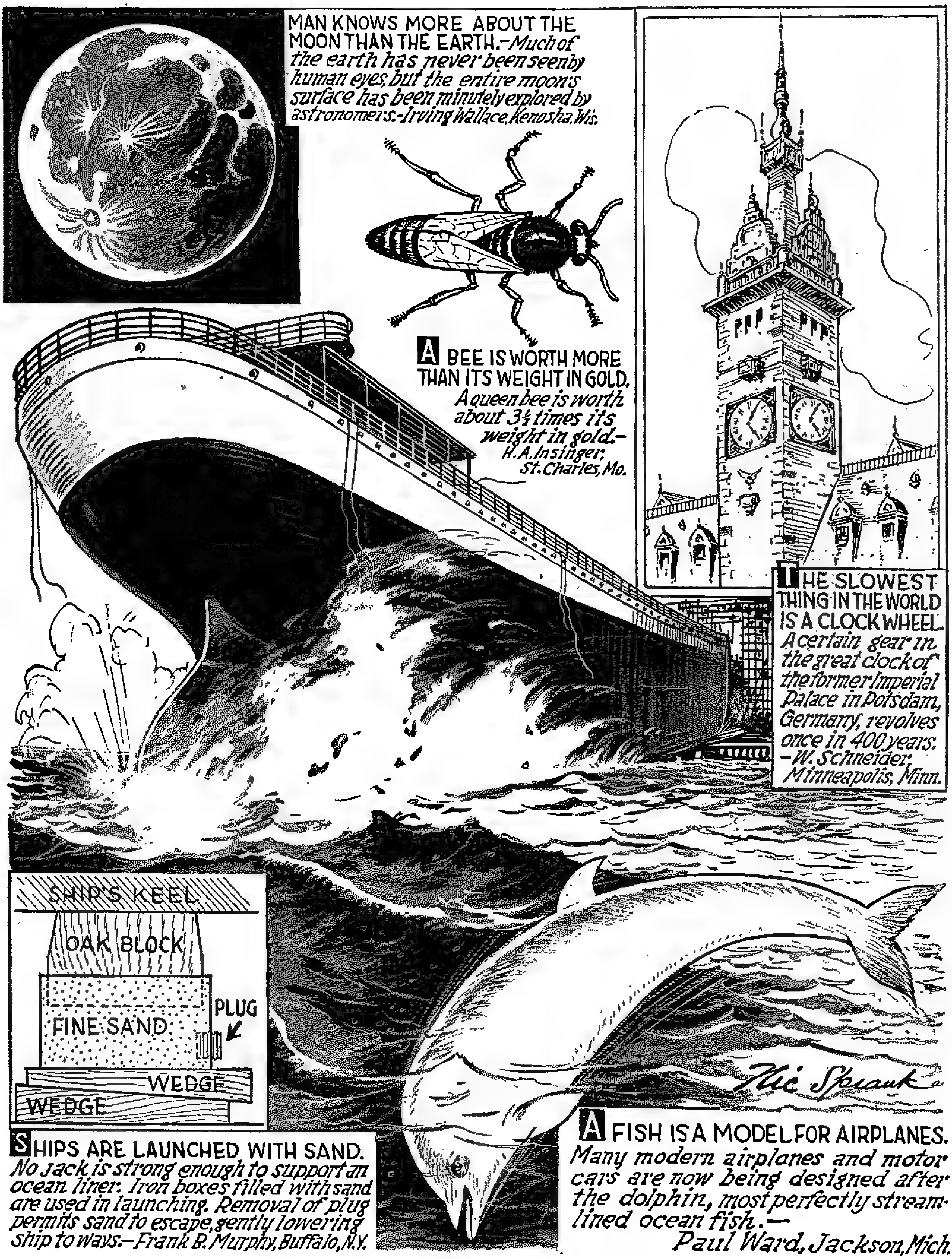
Invented by Francis X. Bushman, former film star, the device will take a photograph of the fleeing criminal or record the license number of the getaway car even if police gun fire misses. The camera operates at an opening of F. 3.5, enabling detectives to take high speed pictures.





Francis X. Bushman, former movie star, is shown at right with his remarkable invention, the camera-gun, which takes still or motion pictures as gun is fired. Even though bullets miss fleeing bandits or escaping motor car, camera makes positive record which may aid in capturing criminals later. Below: Closeup of the camera-gun mechanism.

Ships are LAUNCHED *with Sand, says Nic Sprank in* ODDITIES *of* SCIENCE



MAN KNOWS MORE ABOUT THE MOON THAN THE EARTH.—*Much of the earth has never been seen by human eyes, but the entire moon's surface has been minutely explored by astronomers.—Irving Wallace, Kenosha, Wis.*

A BEE IS WORTH MORE THAN ITS WEIGHT IN GOLD. *A queen bee is worth about 3½ times its weight in gold.—H. A. Insinger, St. Charles, Mo.*

THE SLOWEST THING IN THE WORLD IS A CLOCK WHEEL. *A certain gear in the great clock of the former Imperial Palace in Potsdam, Germany, revolves once in 400 years. —W. Schneider, Minneapolis, Minn.*

SHIPS ARE LAUNCHED WITH SAND. *No jack is strong enough to support an ocean liner. Iron boxes filled with sand are used in launching. Removal of plug permits sand to escape, gently lowering ship to ways.—Frank B. Murphy, Buffalo, N.Y.*

A FISH IS A MODEL FOR AIRPLANES. *Many modern airplanes and motor cars are now being designed after the dolphin, most perfectly streamlined ocean fish.—Paul Ward, Jackson, Mich.*

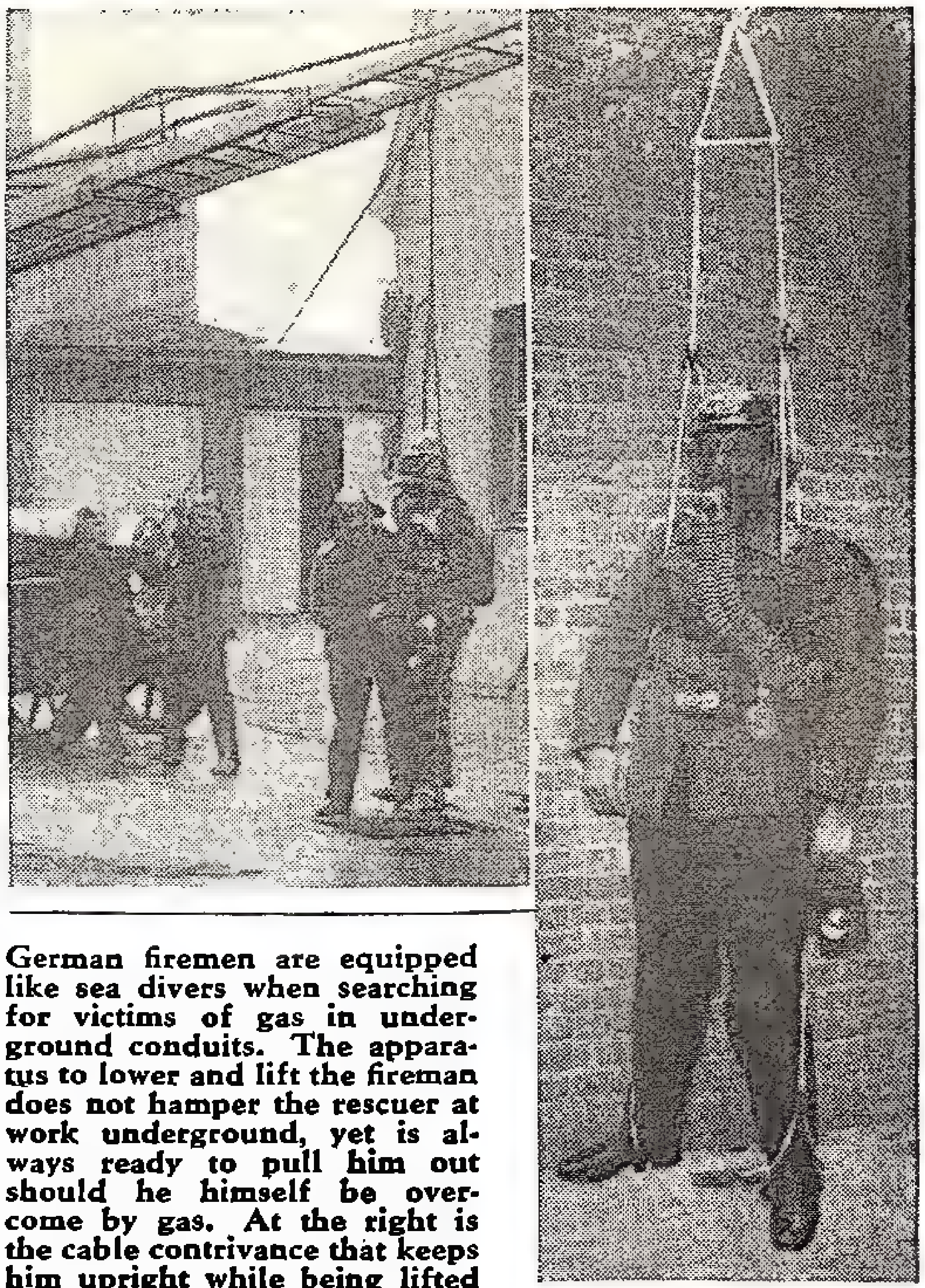
Win $1! Send your Oddity of Science to Nic Sprank, Modern Mechanix and Inventions, 529 S. 7th St., Minneapolis.

German Life Saving Suits Handled by Huge Cranes

LIKE sea divers, German firemen are now equipped to protect their own lives when rescuing victims of gas in underground mains.

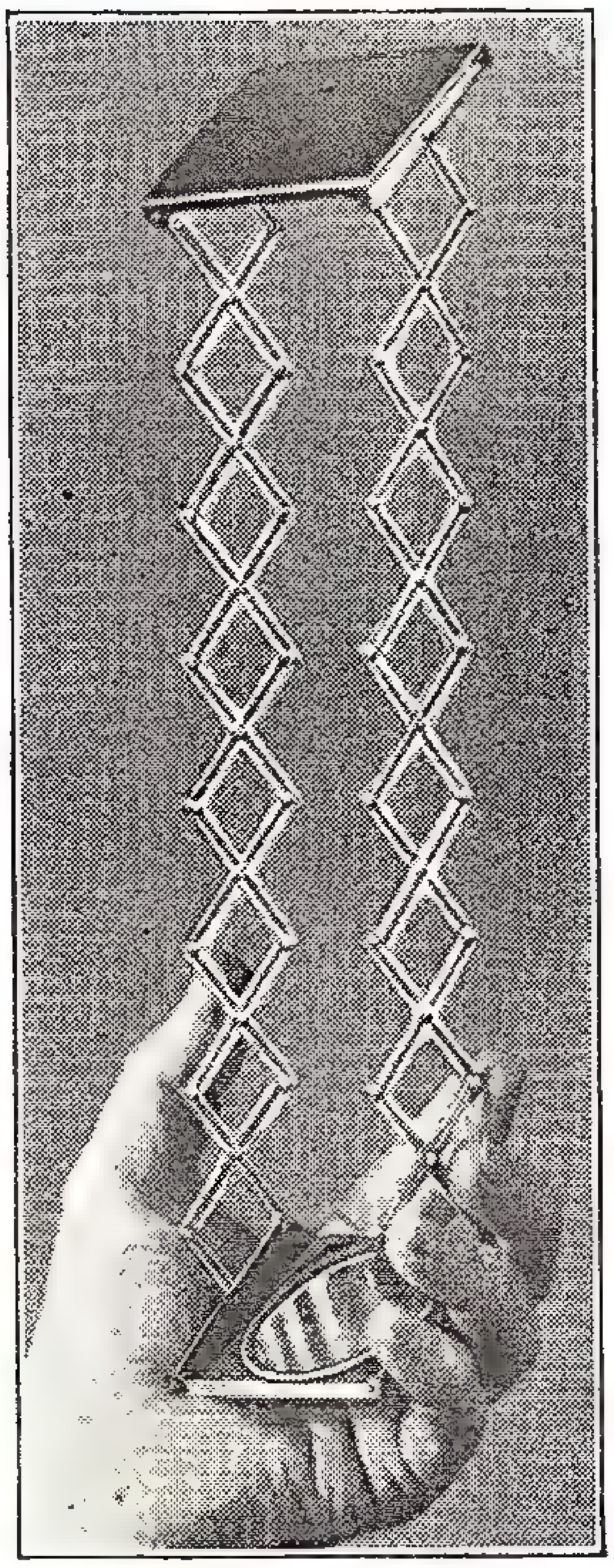
A cable lifting and lowering apparatus permits the fireman full freedom of move ment while searching for gas victims in underground mains. If the fireman himself is overcome, he can be raised, as is done with a sea diver, from the conduit in an upright position, a necessity due to the narrow openings in mains.

The ladder truck serves as a derrick, a pulley being attached to a ladder held over a conduit. The fireman is further fitted with a gas mask and electric lamp.



German firemen are equipped like sea divers when searching for victims of gas in underground conduits. The apparatus to lower and lift the fireman does not hamper the rescuer at work underground, yet is always ready to pull him out should he himself be overcome by gas. At the right is the cable contrivance that keeps him upright while being lifted through street opening of main.

Tall Men No Longer Cut Off View



Views of games obstructed by tall men can be improved with the little device shown above.

VIEW of football and baseball games or shows shut off by the tall man or woman wearing a hat in front should not bother spectators any longer with the device pictured at the left.

The instrument works on the principle of the periscope with a mirror in each end. The spectator whose view is obscured places the lower mirror at or near the level of the eye. Upper mirror stretches over his head to whatever height he wishes in order to get an unobstructed view of the game or show. The image is reflected from the upper mirror to the lower.

Jupiter May Predict Our Weather

PREDICTING weather on this world by watching bands and spots on the planet Jupiter may develop from a series of observations conducted by Professor Lucien Rudaux, of the Donville observatory in France. For years Professor Rudaux has watched light and dark bands and spots, believed to be cloud layers controlled by the sun and Jupiter's moons. The same solar influence affects the earth's weather.

Robots Guide Transport Planes

AN AUTOMATIC pilot, called an "airobot," now guides trans-continental passenger airplanes from one city to another without the aid of the human pilot.

The "airobot" is now in use on 3-mile-a-minute transport planes operating between New York, Chicago and the Pacific coast. It was designed to relieve human pilots of the effort of flying a plane.

THE TRANSCONTINENTAL ROBOT

A robot that eliminates the work of the human pilot on transport planes is shown above. The metal box, about a foot square, guides 3-mile-a-minute passenger airplanes.

How CARNIVAL Racketeers

Clever sharpers rob the public of vast sums in carnival games. This story reveals their secrets.

You can't win!
GEARS IN HUB OF WHEEL

Eager crowds, like that above, throng the carnivals and sideshows, squandering dimes and quarters on devices whose odds are fixed in favor of the operator. Right, a percentage wheel, in which the winning numbers are predetermined by a series of gears in the hub. Carnival confederates, knowing the various sequences, cover these numbers and walk off with the prizes.

by EARL CHAPIN

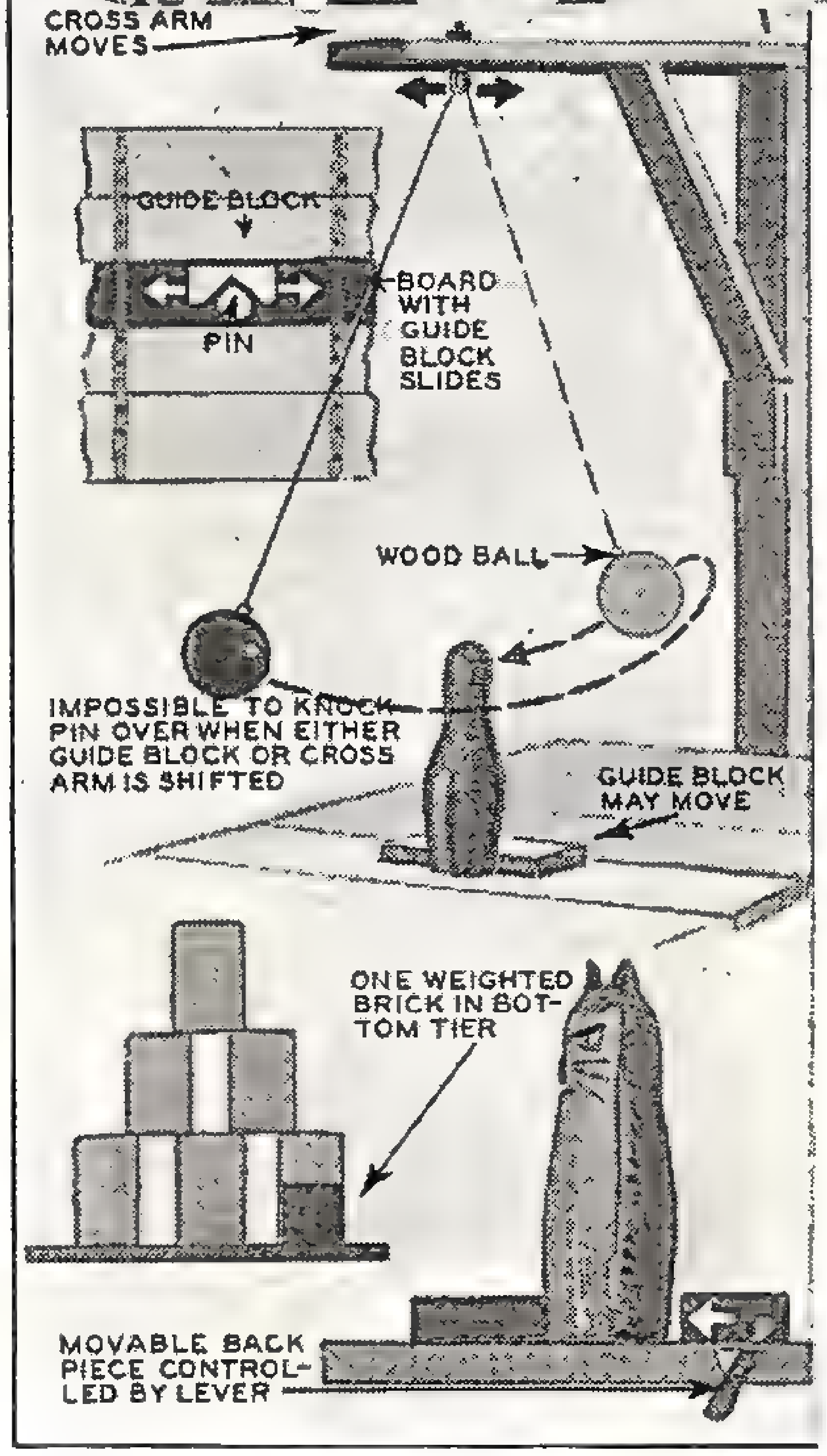
MILLIONS of dollars are taken from the public by clever operators of the smaller sideshows and carnivals who have capitalized upon the American love for games of chance.

Cries of "Try your luck" still meet with ready response despite the fact that one might as well back a three-legged horse to win the Derby as to buck the carnival games and gyp wheels. But the gullible bystander persists. He believes that luck and the law of averages has something to do with it—and he's right; but the luck is all with the operator. The player doesn't stand a chance. He can't win because the games are set against him.

The Mechanism of the Ball and Tenpin Game

A good example of the mechanical ingenuity behind some of the devices used to fleece a customer is afforded by the familiar "Ball and Tenpin" game. A ball, suspended by a chain from a gibbet-like cross-arm, swings in an arc on a level that permits it to bowl over a tenpin set in a notch on the platform below. The player must release the ball in such a manner that it passes the pin going out, but bowls it over on the back swing. When the operator demonstrates the trick it looks amazingly simple; but, try as he will, the player cannot duplicate the performance. The secret lies in the fact that the tenpin isn't where it was when the operator was demonstrating a moment before. Not even the man who invented the trick could beat his own game now. By a simple mechanical adjustment the notch in which the tenpin rests may move, the entire board may move or the arc of the swinging ball may be changed.

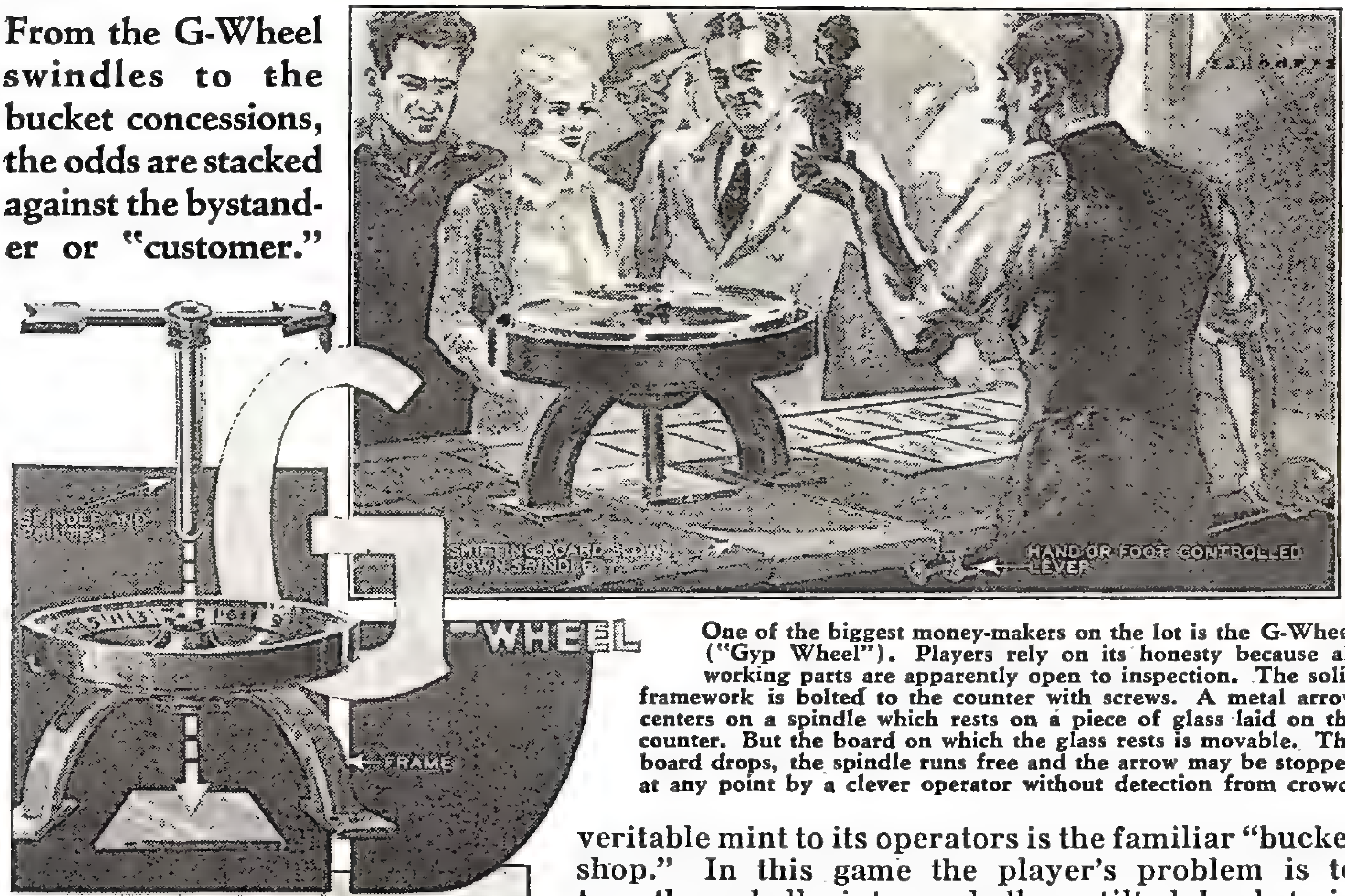
Another carnival racket which has proven a


CROSS ARM MOVES
GUIDE BLOCK
PIN
BOARD WITH GUIDE BLOCK SLIDES
WOOD BALL
IMPOSSIBLE TO KNOCK PIN OVER WHEN EITHER GUIDE BLOCK OR CROSS ARM IS SHIFTED
GUIDE BLOCK MAY MOVE
ONE WEIGHTED BRICK IN BOTTOM TIER
MOVABLE BACK PIECE CONTROLLED BY LEVER

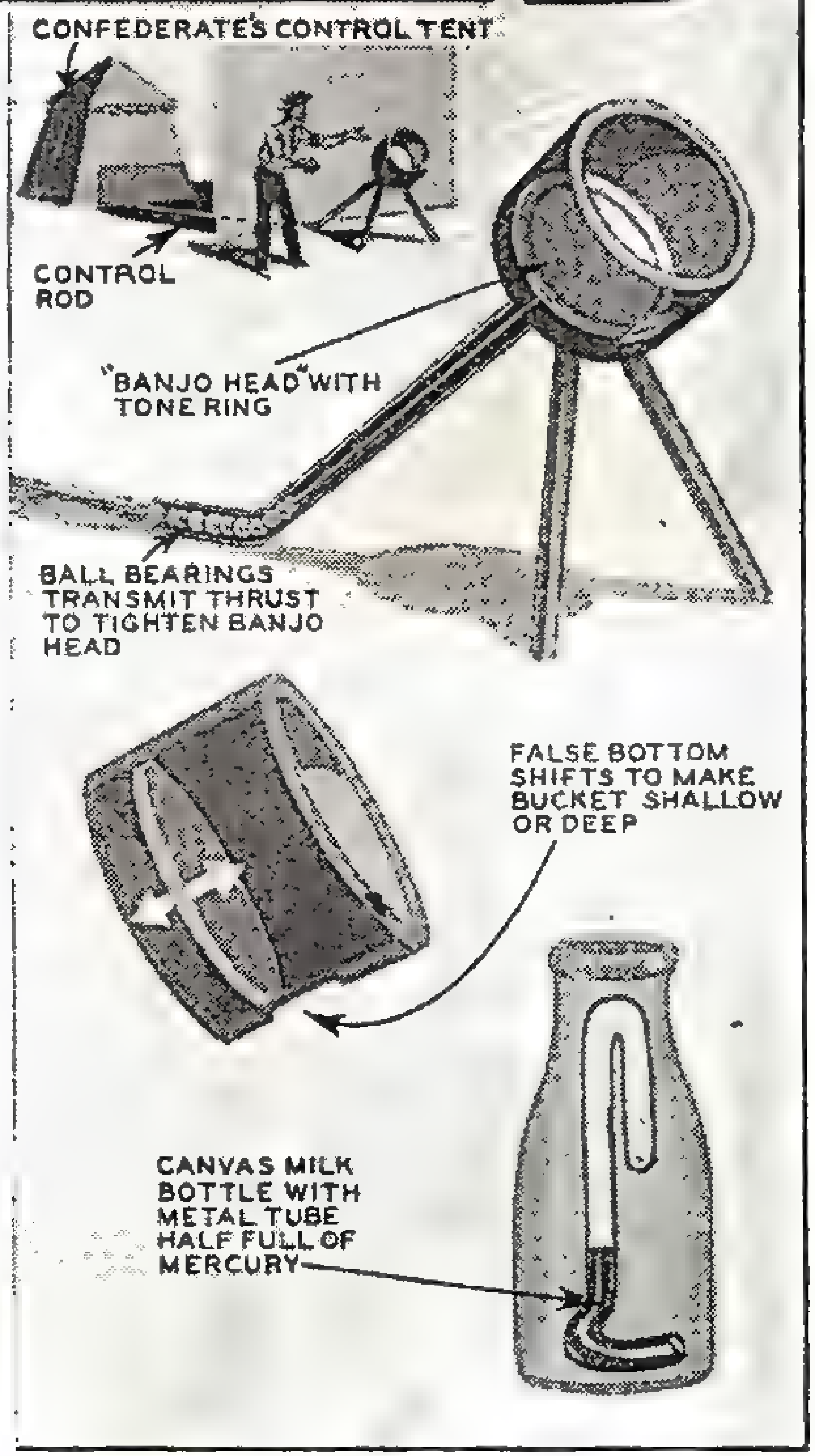
Above, three games which the player cannot beat. Diagram shows how tenpin game works. Weighted brick in pyramid cannot be knocked from counter. A lever locks the cat in place.

FLEECE the PUBLIC

From the G-Wheel swindles to the bucket concessions, the odds are stacked against the bystander or "customer."


SPINDLE AND POINTER
SHIFTING BOARD SLOWS DOWN SPINDLE
HAND OR FOOT CONTROLLED LEVER
G-WHEEL
FRAME

One of the biggest money-makers on the lot is the G-Wheel ("Gyp Wheel"). Players rely on its honesty because all working parts are apparently open to inspection. The solid framework is bolted to the counter with screws. A metal arrow centers on a spindle which rests on a piece of glass laid on the counter. But the board on which the glass rests is movable. The board drops, the spindle runs free and the arrow may be stopped at any point by a clever operator without detection from crowd.


CONFEDERATE'S CONTROL TENT
CONTROL ROD
"BANJO HEAD" WITH TONE RING
BALL BEARINGS TRANSMIT THRUST TO TIGHTEN BANJO HEAD
FALSE BOTTOM SHIFTS TO MAKE BUCKET SHALLOW OR DEEP
CANVAS MILK BOTTLE WITH METAL TUBE HALF FULL OF MERCURY

Above, control rods tighten the bucket bottom, making the balls bounce out. Right, mercury in milk bottle is shifted at will. When at bottom, the player cannot knock the bottle over.

veritable mint to its operators is the familiar "bucket shop." In this game the player's problem is to toss three balls into a shallow, tilted bucket, in such a manner that the balls will not bounce out over the rim again, but instead roll out of the round hole on the downward side.

While the operator drops the balls into the bucket with consummate ease, the player invariably tosses one ball a little too hard and it bounces out again. If the player scents trickery and protests, the operator may even take his bucket out onto the fairway and prove to his customer that he can still make his balls stay put. Convinced, the customer tries again, but with no more success than before.

Of course he can't win! The bucket has a false bottom which either permits or precludes the possibility of making a successful toss by the simple turn of a confederate's wrist.

Why the Balls Bounce From the Bucket

The bucket may have either a "banjo head" bottom, or one which moves up or down, causing the receptacle either to be deep or shallow. The "banjo head" bottom is made of pliable material which is made taut or lax by the pressure of a circular piece of steel which acts in the same manner as the tone ring in expensive banjos. When the bottom is at its maximum springiness, the ball will bounce out no matter how easily it may be tossed.

The operator communicates with his confederate by means of word signals included in his conversation with onlookers. The accomplice may be behind a curtain within the stand, or in a control room near by. Usually it is the latter case, for this arrangement avoids detection.

(Continued on page 124)

Skeleton Robot Shows Perfect Golf Swing in Slow Motion

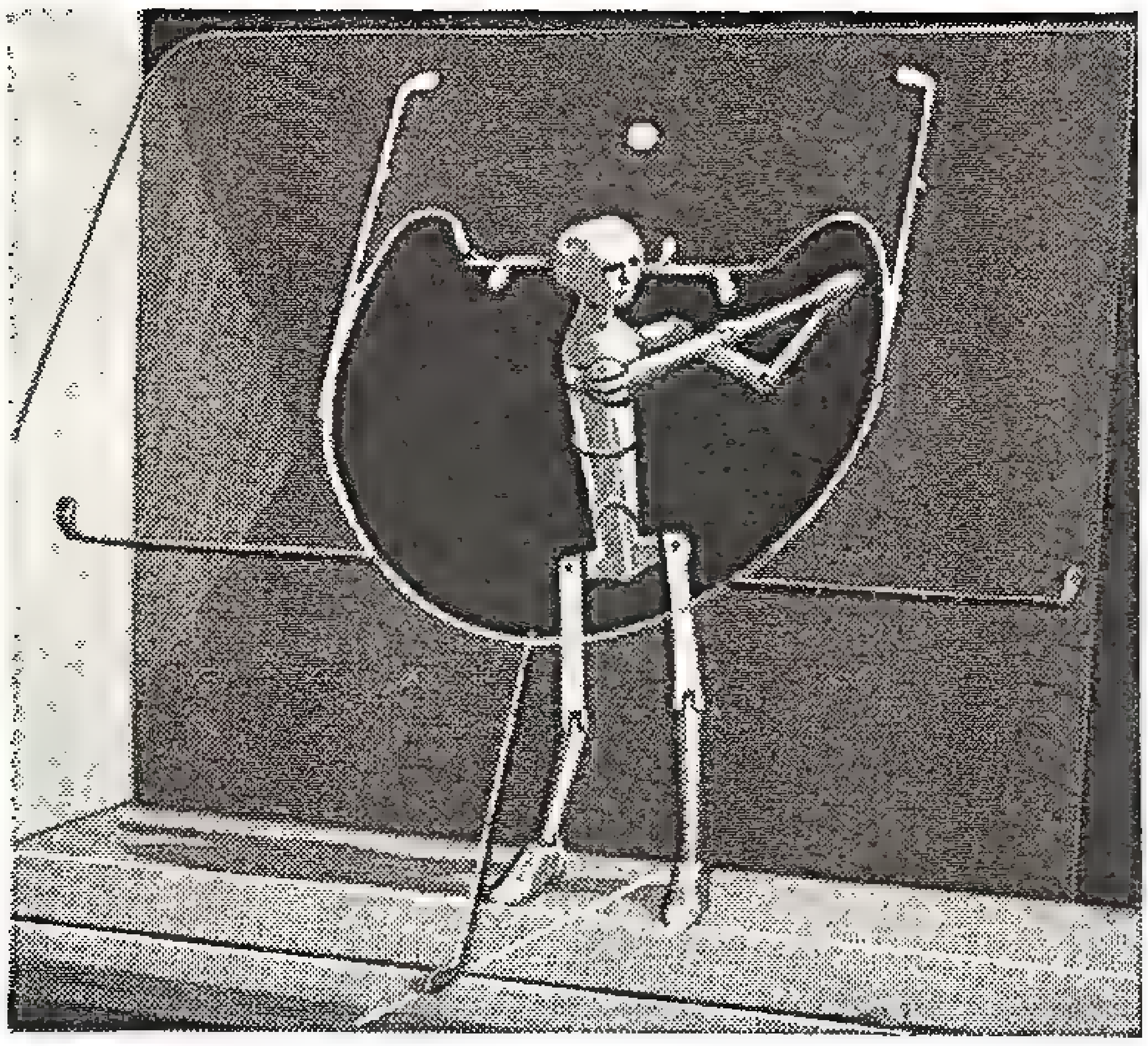


Photo shows the electrically operated golf robot whose limbs assume proper position for each stage of the stroke.

PERFECT golf, the dream of every duffer, is now possible through study of a robot that executes a faultless golf swing in slow motion.

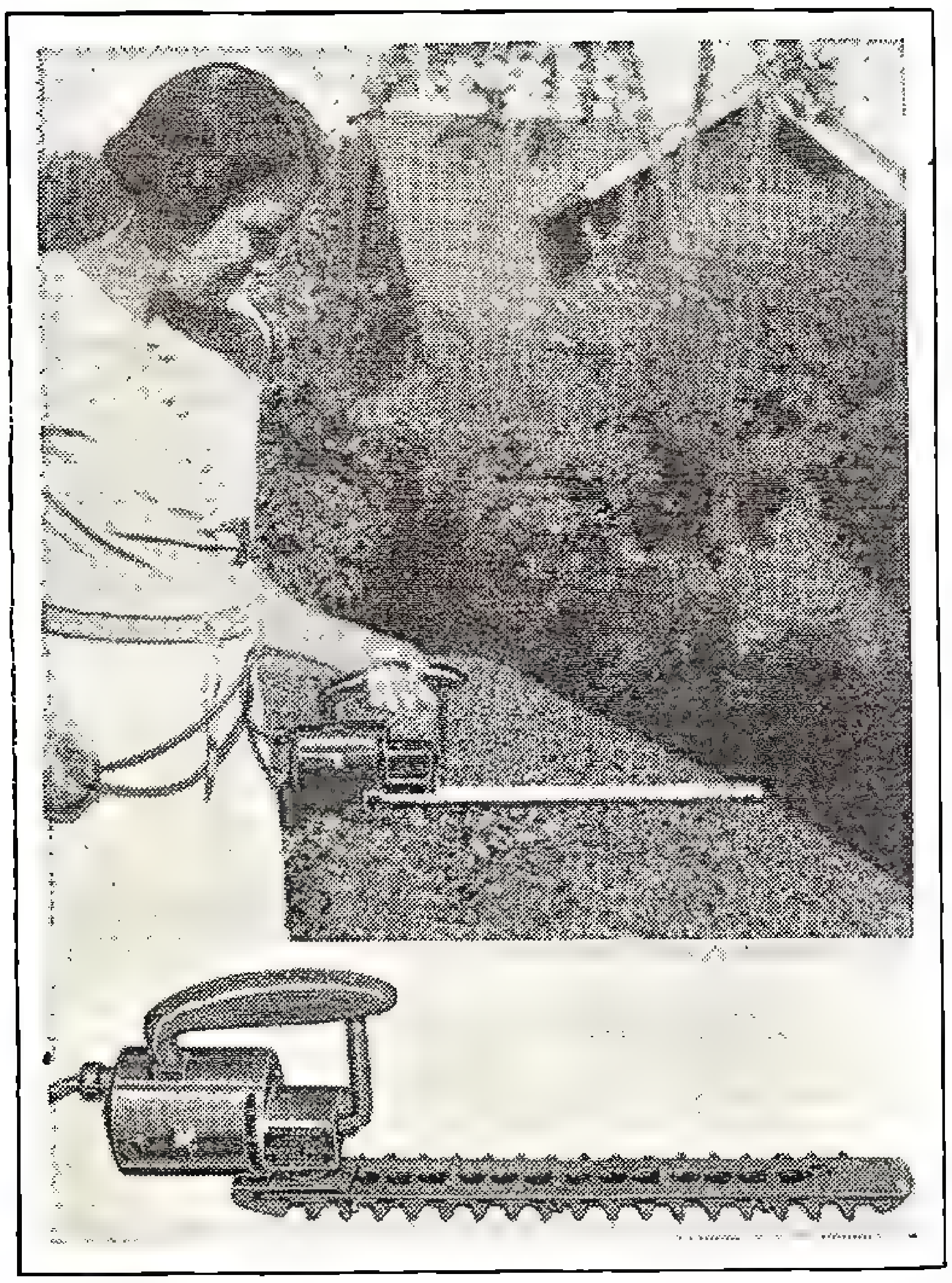
The robot is skeletonized, enabling the novice to study the body movements ordinarily hidden by clothing. As the downswing is started, the head, shoulders, arms, hips, legs and feet of the robot move into co-ordinated position. Every detail of the complete stroke is shown in the mechanized figure.

Electrically operated, the golf robot is about 18 inches high. It projects through a glass plane to which seven miniature clubs are fastened in the proper positions for the various parts of the swing.

Motor Drives New Hedge Clipper

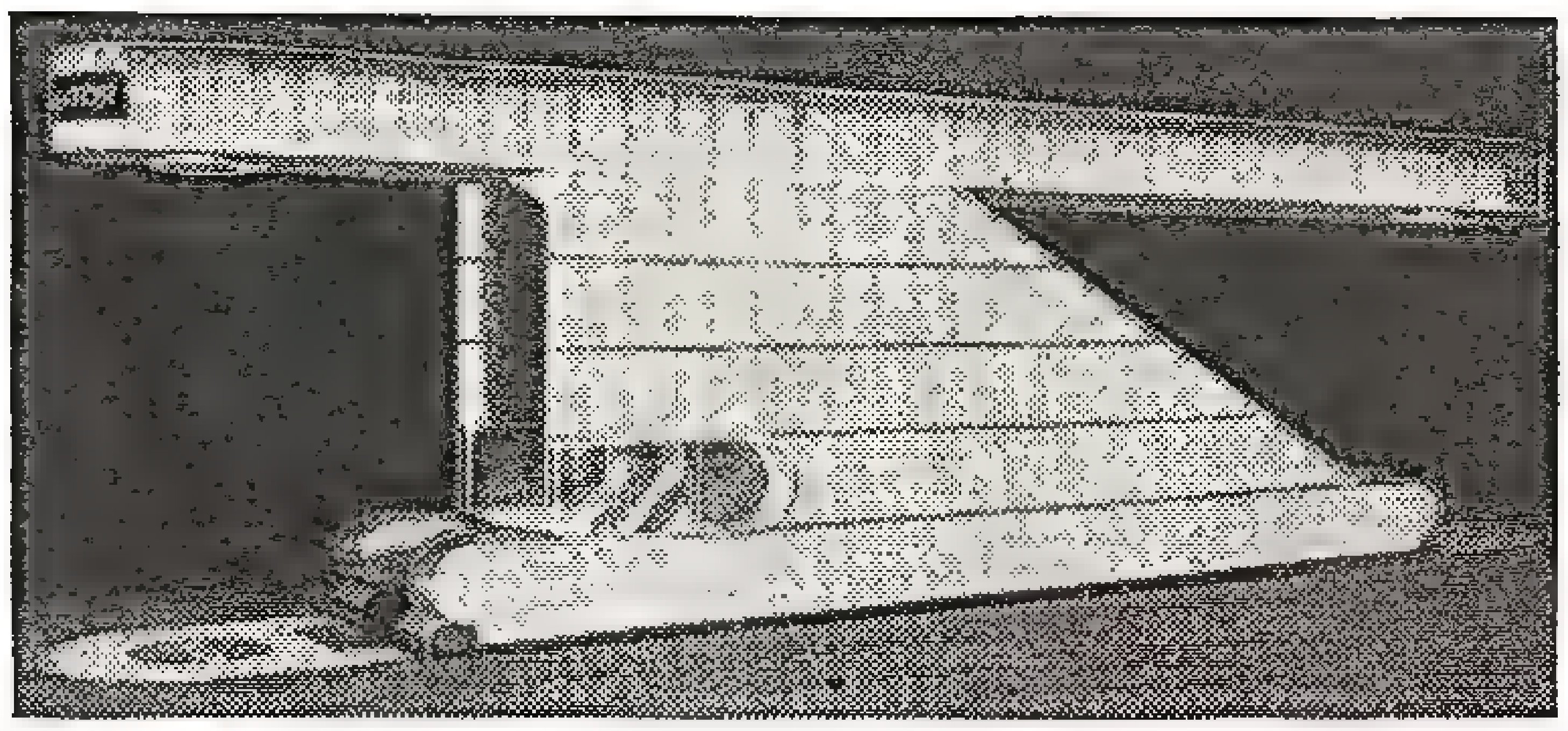
ORDINARILY a long and tiresome task, trimming the hedge or other lawn shrubbery becomes a comparatively simple job with a new powerdriven cutting tool.

An endless belt of cutting teeth works against a set of stationary teeth, much on the principle of a mowing machine. The shears weigh only six pounds and are driven by an electric motor.



Top photo shows simplicity of operation of the hedge shears. Below, a closeup, showing the machine in detail.

Latest Escalators Streamlined



A view of the modernized escalator, showing streamline influence. Note built-in show cases near landing stage.

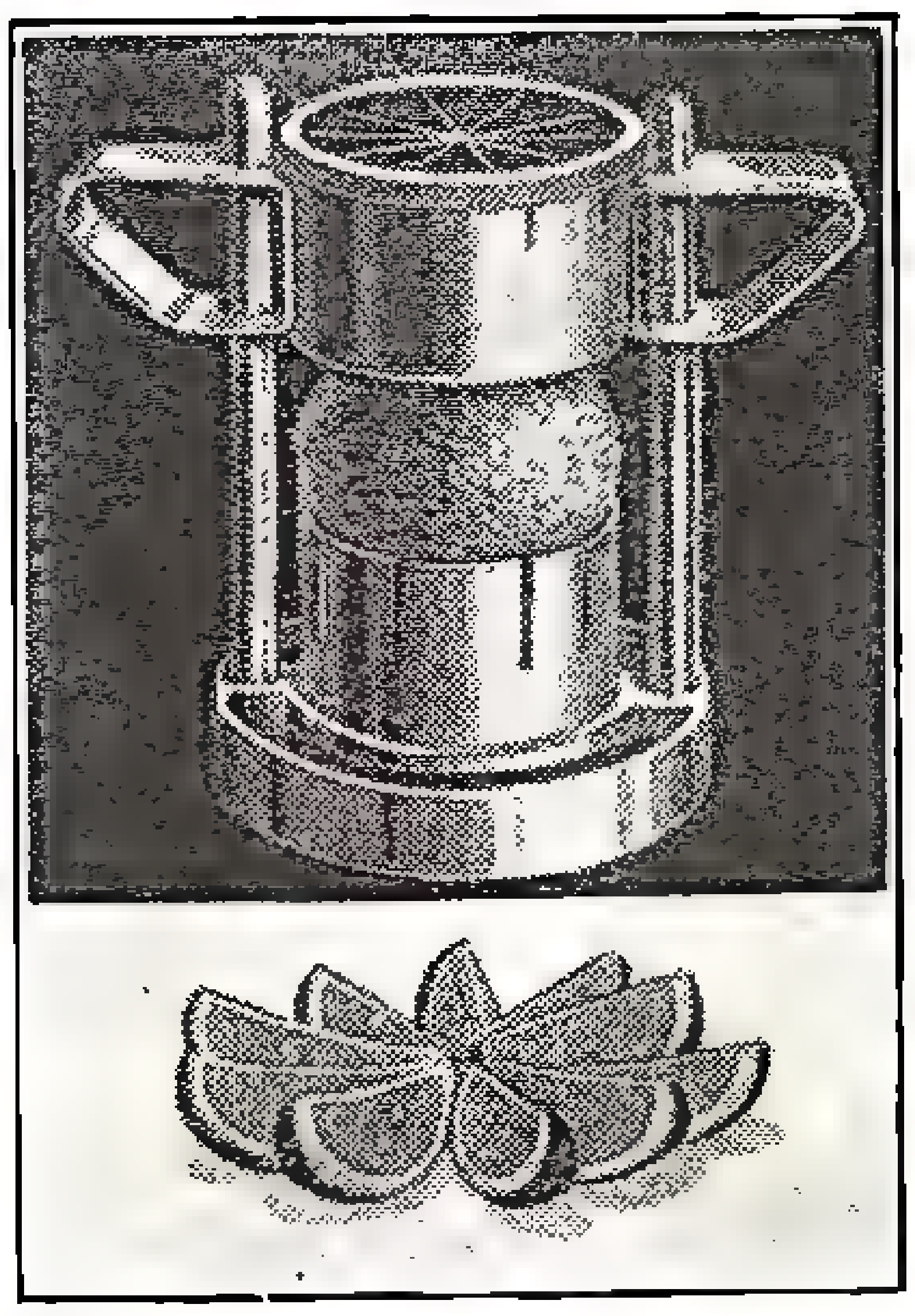
COMBINING beauty with utility, engineers are applying streamline principles to department store escalators, or moving stairways.

The sides of the canopy enclosing the mechanism for the escalator to the floor above are to be utilized for moving messages. Another feature of the new models is a set of show cases built into the escalator sides.

Lemon Slicer Cuts Ten Sections

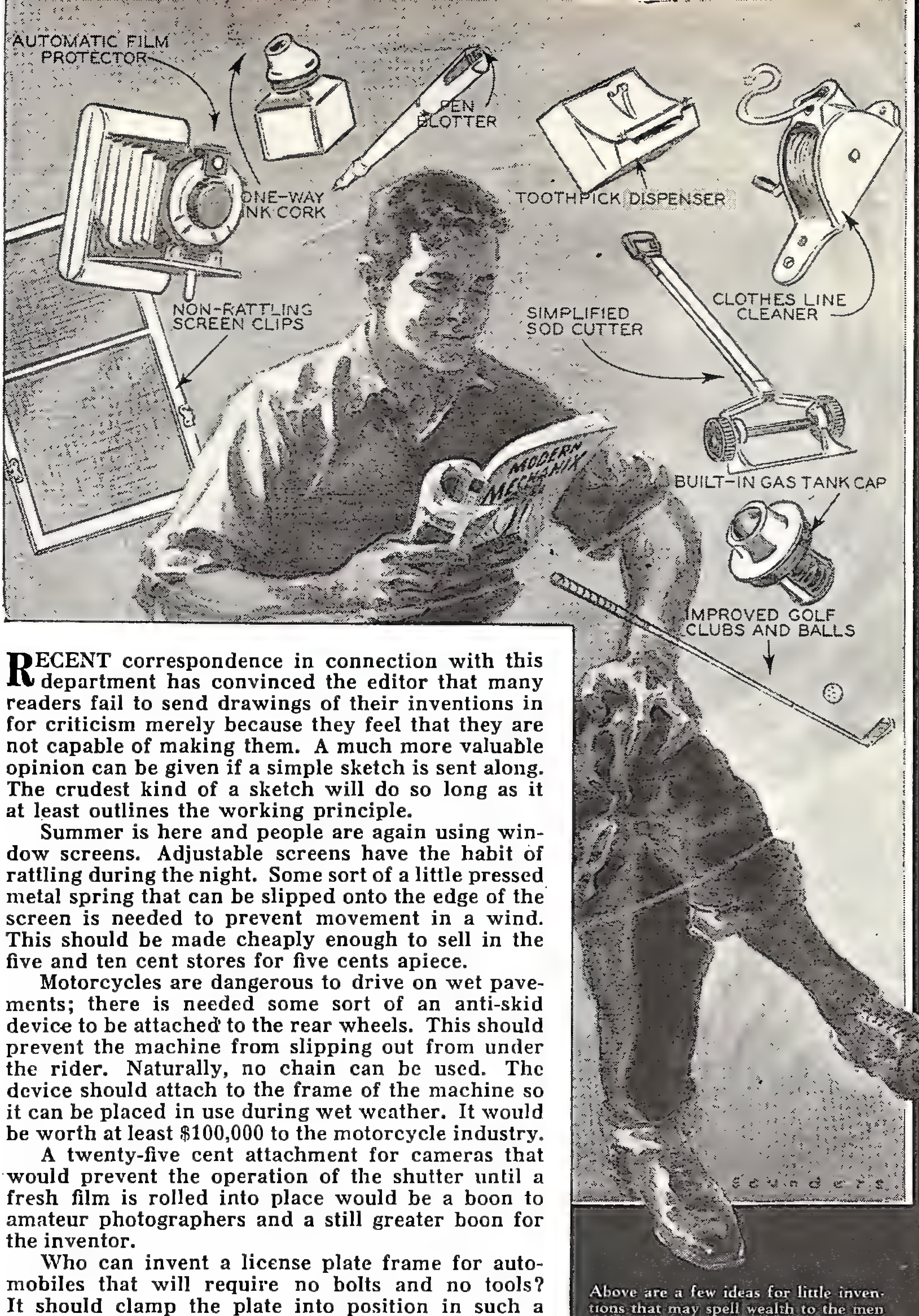
AN INGENIOUS arrangement of ten knives neatly cuts the fruit into uniform sections in a new lemon slicer now on the market.

The knives are both rust and acid proof and simple construction makes them easy to clean. The juice is caught in a cup-like receptacle at the bottom of the device.



Uniform sections are speedily cut with this new lemon slicer.

NEEDED INVENTIONS



Above are a few ideas for little inventions that may spell wealth to the men who can solve the problems described in the text. If you want to know how to secure a patent or how to protect your idea, send a letter to the Patent Editor, 529 South Seventh Street, Minneapolis, Minn. Be sure to include stamped self-addressed envelope. Send sketches if possible. Models can not be accepted.

RECENT correspondence in connection with this department has convinced the editor that many readers fail to send drawings of their inventions in for criticism merely because they feel that they are not capable of making them. A much more valuable opinion can be given if a simple sketch is sent along. The crudest kind of a sketch will do so long as it at least outlines the working principle.

Summer is here and people are again using window screens. Adjustable screens have the habit of rattling during the night. Some sort of a little pressed metal spring that can be slipped onto the edge of the screen is needed to prevent movement in a wind. This should be made cheaply enough to sell in the five and ten cent stores for five cents apiece.

Motorcycles are dangerous to drive on wet pavements; there is needed some sort of an anti-skid device to be attached to the rear wheels. This should prevent the machine from slipping out from under the rider. Naturally, no chain can be used. The device should attach to the frame of the machine so it can be placed in use during wet weather. It would be worth at least $100,000 to the motorcycle industry.

A twenty-five cent attachment for cameras that would prevent the operation of the shutter until a fresh film is rolled into place would be a boon to amateur photographers and a still greater boon for the inventor.

Who can invent a license plate frame for automobiles that will require no bolts and no tools? It should clamp the plate into position in such a positive fashion that it cannot be jarred loose.

Gardeners need a special sod cutting shovel that will more or less automatically cut a square foot of sod three inches thick. This would take a great deal of the backache out of such work, and at the same time speed the operation up 100%.

Large dressmaking establishments and garment factories cut cloth with motor-driven rotary knives.

(Continued on page 142)

Composer's Dream Leads to the Invention of a New Piano

This double keyboard piano was designed after the late Emanuel Moor had a dream in which he saw Johann Sebastian Bach standing at a piano with two keyboards. The photo shows Mrs. Moor demonstrating the instrument.

A DOUBLE keyboard piano has been designed as the result of an uncannily real dream of a Hungarian composer.

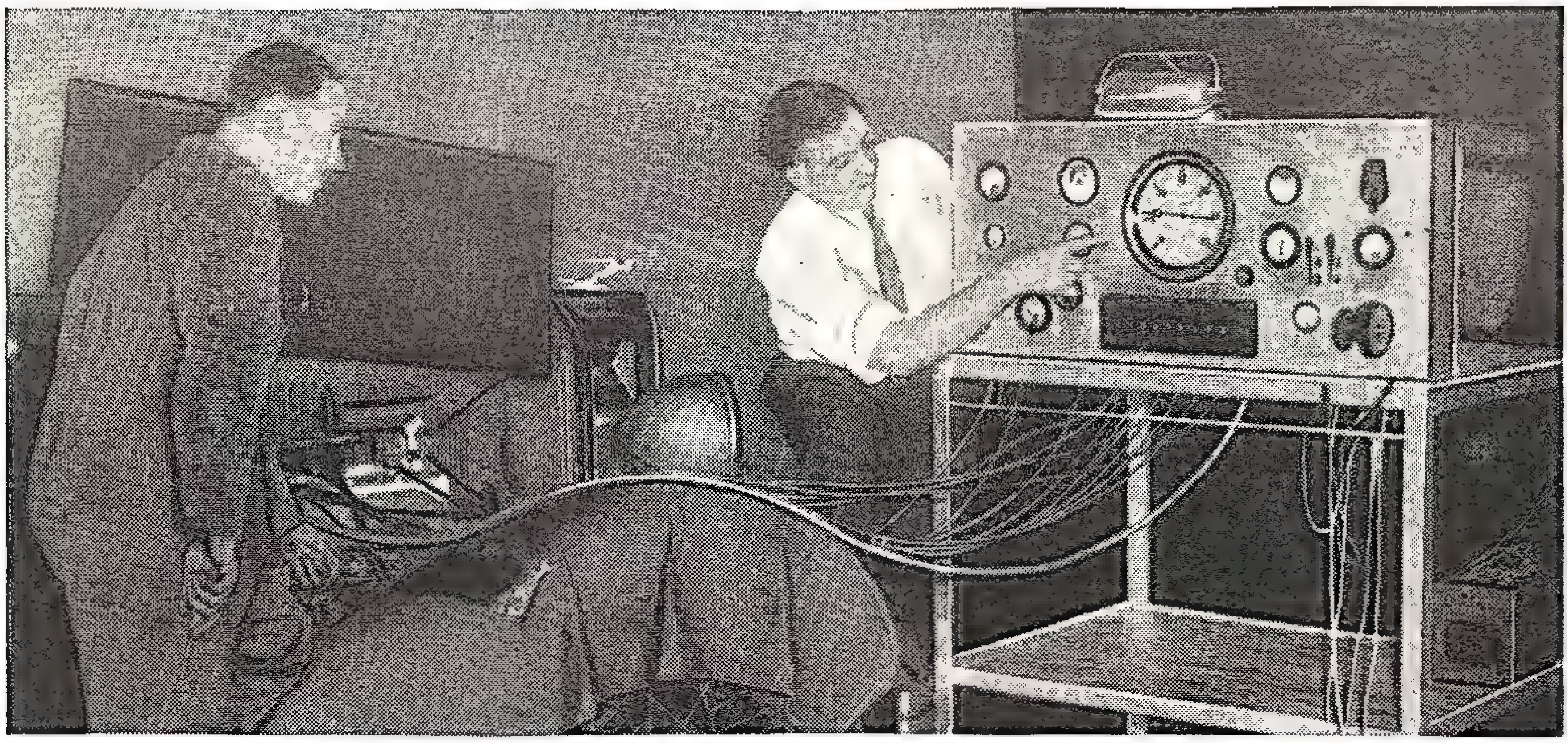
In 1921 the composer, Emanuel Moor, had a dream in which he saw the famous composer, Johann Sebastian Bach, standing at a piano with a double keyboard. Moor immediately started to tear down his piano and rebuild the "dream instrument." When he died, his wife continued the work until the piano was finished. The instrument, now on exhibition, is said to hold its own against a full orchestra.

Electric Ear Finds Car Knocks

AN ELECTRICAL ear quickly diagnoses motor noises and locates trouble in automobile engines.

A number of electric wire cords from the instrument are attached to the spark plugs and other parts of the motor. Acting like doctors' stethoscopes, these cords amplify motor noises and convey electrical impulses to a number of dials which indicate where the trouble is.

The analyzer was invented by Conrad Mueller, mechanic, and Lou Pearl, former racing car driver, after seven years of experiments. The instrument eliminates the necessity of mechanics straining their ears in an effort to locate noises and knocks.

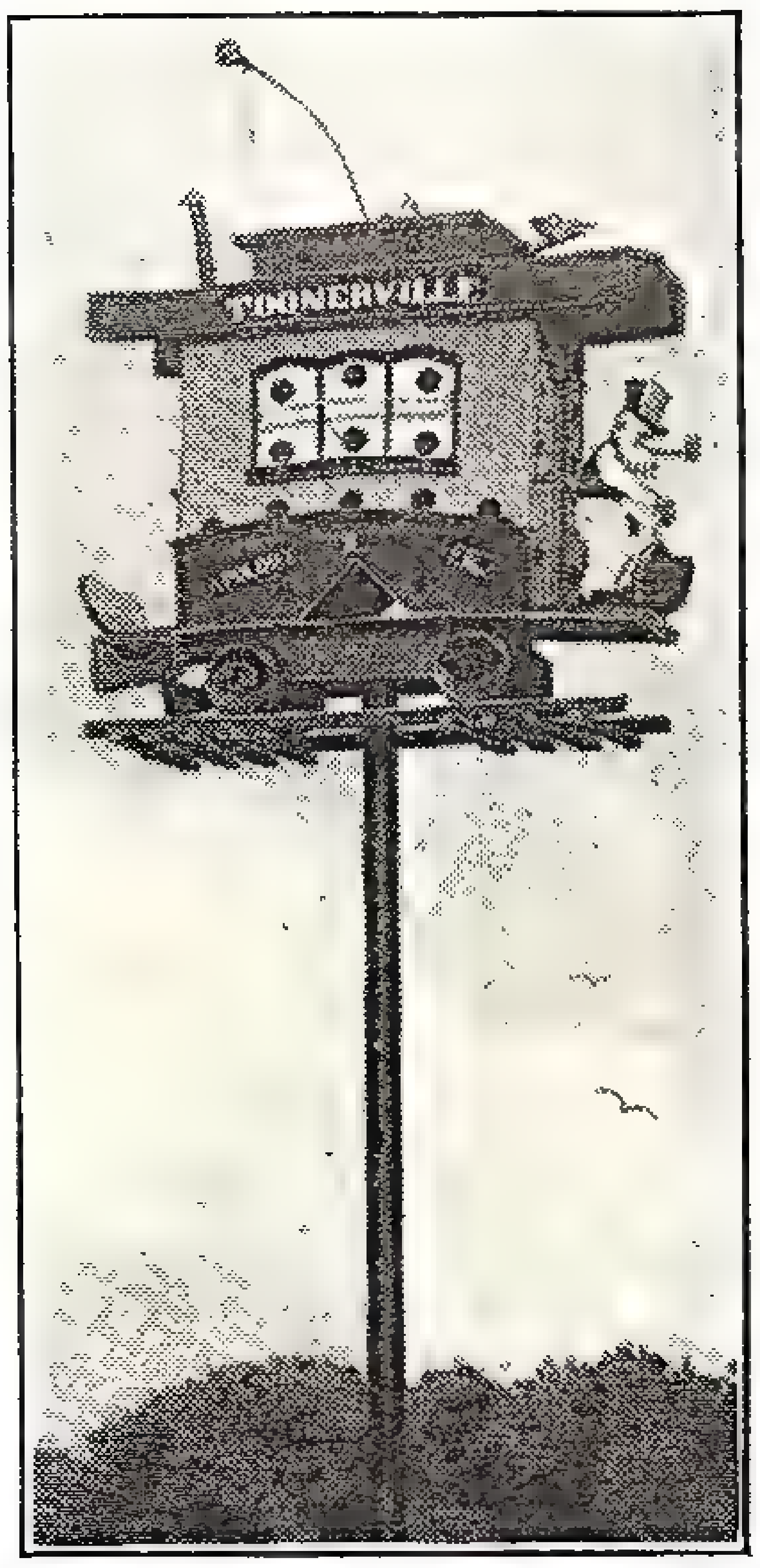


The dials of this new electric motor trouble analyzer show that the automobile being tested here has two faulty valves.

Comic Trolley Houses Birds

AN unusual bird house, a replica of Fontaine Fox's rickety "Toonerville Trolley," has 45 feathery tenants.

Even the well-known "skipper" of the popular cartoon graces the replica on lawn of Fritz Meyn, sportsman, of Lawrence, Kans. The bird house, built of scrap wood and metal, is five feet long and four feet high and weighs 150 pounds. It stands on a section of track on top of a 50-ft. pole. The cartoon bird house is complete.



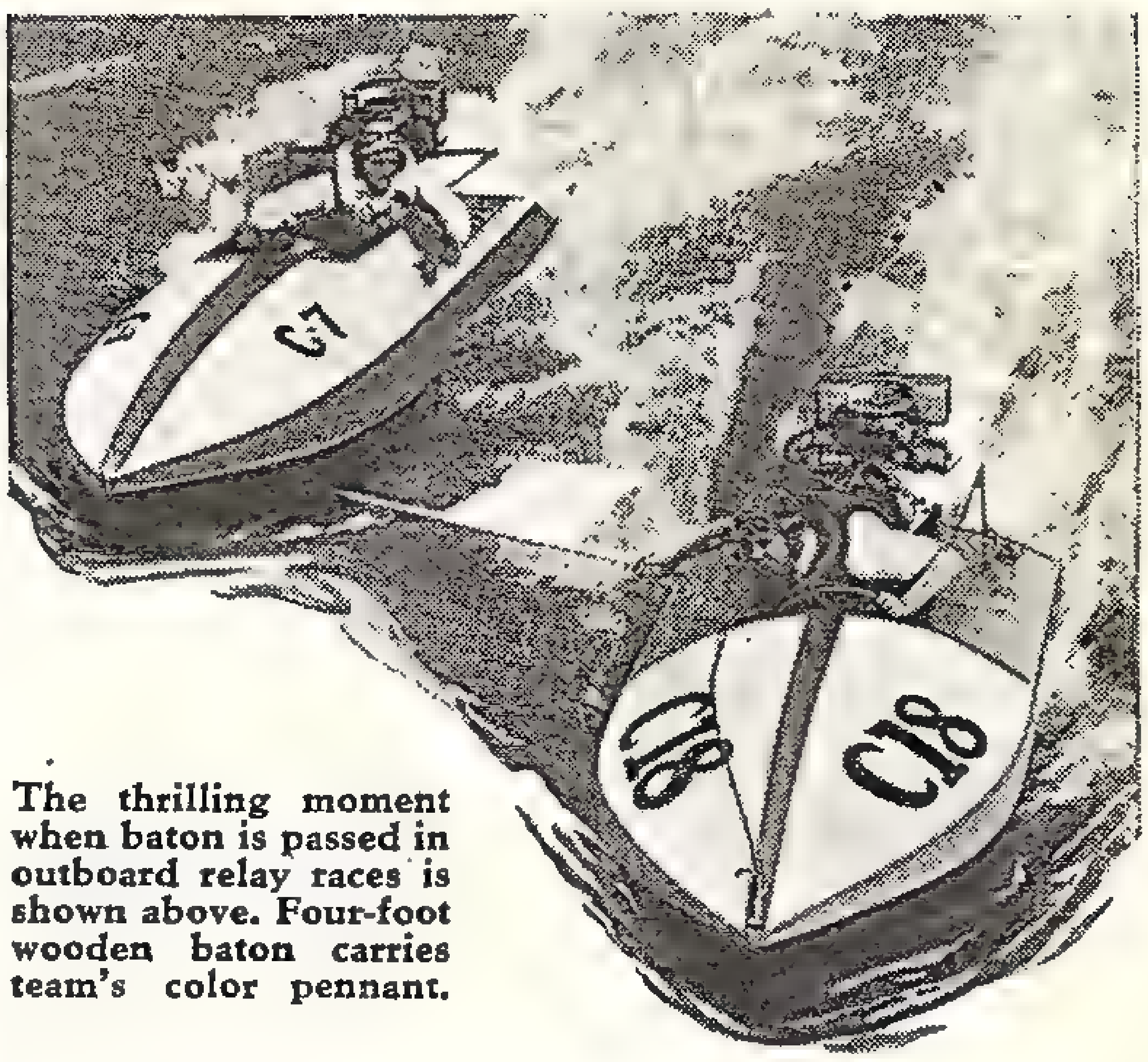
This "Toonerville Trolley" bird house has 45 tenants.

Speed Boat Relay Racing Is Latest Sport for Outboards

SPEED boat relay racing is a new and spectacular water sport. Fast action, spills and thrills are witnessed as the participants pass the baton going at full speed.

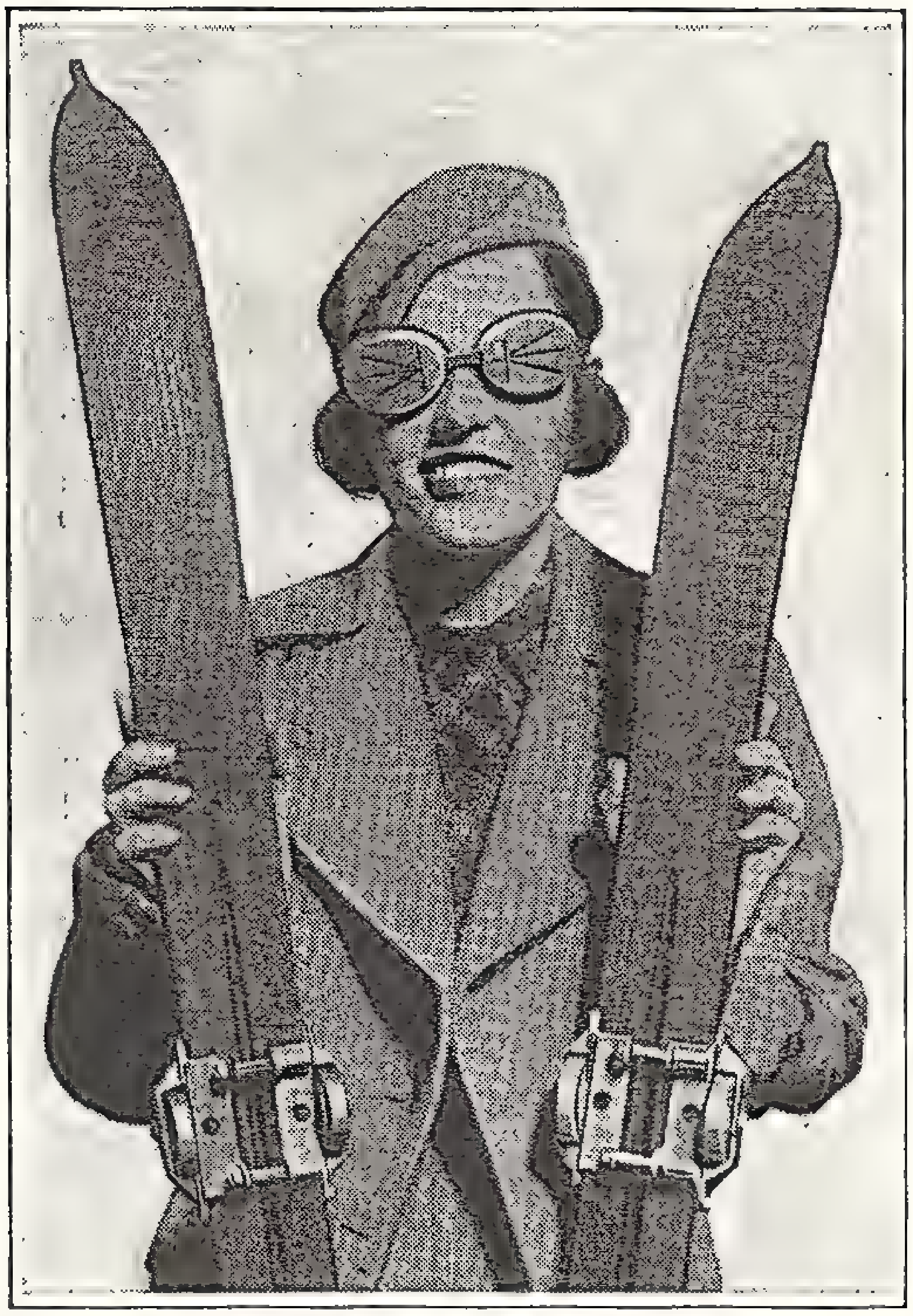
In races held at Long Beach, Calif., recently four teams of two boats each entered. The race was run over a distance of five miles.

Four boats, the pilot of each carrying a baton, start the race in the usual manner. At the end of the second lap the four relay boats start out on the course. The baton is passed during the third lap. When the relay boat gets the baton, the pilot continues the races as his teammate drops out.



The thrilling moment when baton is passed in outboard relay races is shown above. Four-foot wooden baton carries team's color pennant.

Roller Skate Skis Used Indoors



Skis with wheels are used in indoor exhibitions. Metal glasses with slits prevent snow blindness while outdoors.

SKIS equipped with wheels are being used for indoor exhibitions in Sweden. The wheels, resembling those on roller skates, are placed in pairs in the center of each ski. The roller equipped skis permit indoor exhibitions on wooden ski slides.

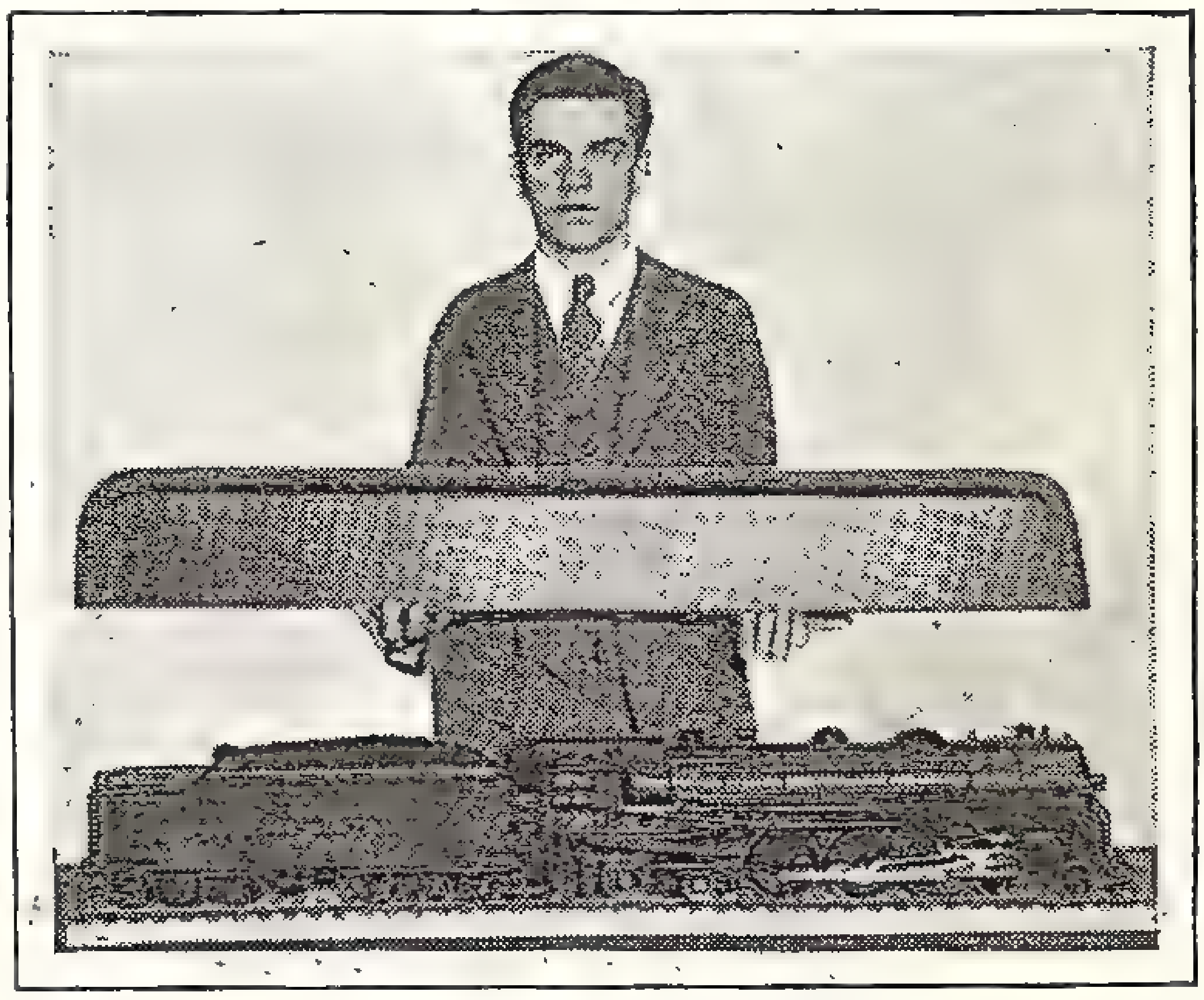
Metal protectors for the eyes are also being used in Sweden by outdoor skiers. These ski glasses are designed to keep flying and blinding snow out of the eyes. They are made of metal with small fissures to cut down light reflected from snow.

Designs Streamline Train Shell

STREAMLINE shells to cut down the wind resistance of ordinary railroad locomotives and tenders have been designed by Norman F. Zapf, senior student at Case University.

A single, long shell, made of aluminum alloy metal, fits snugly over both engine and tender to convert the train power plant into modern streamline equipment. The shell eliminates the necessity of building new streamline locomotives to meet the competition of new high speed trains.

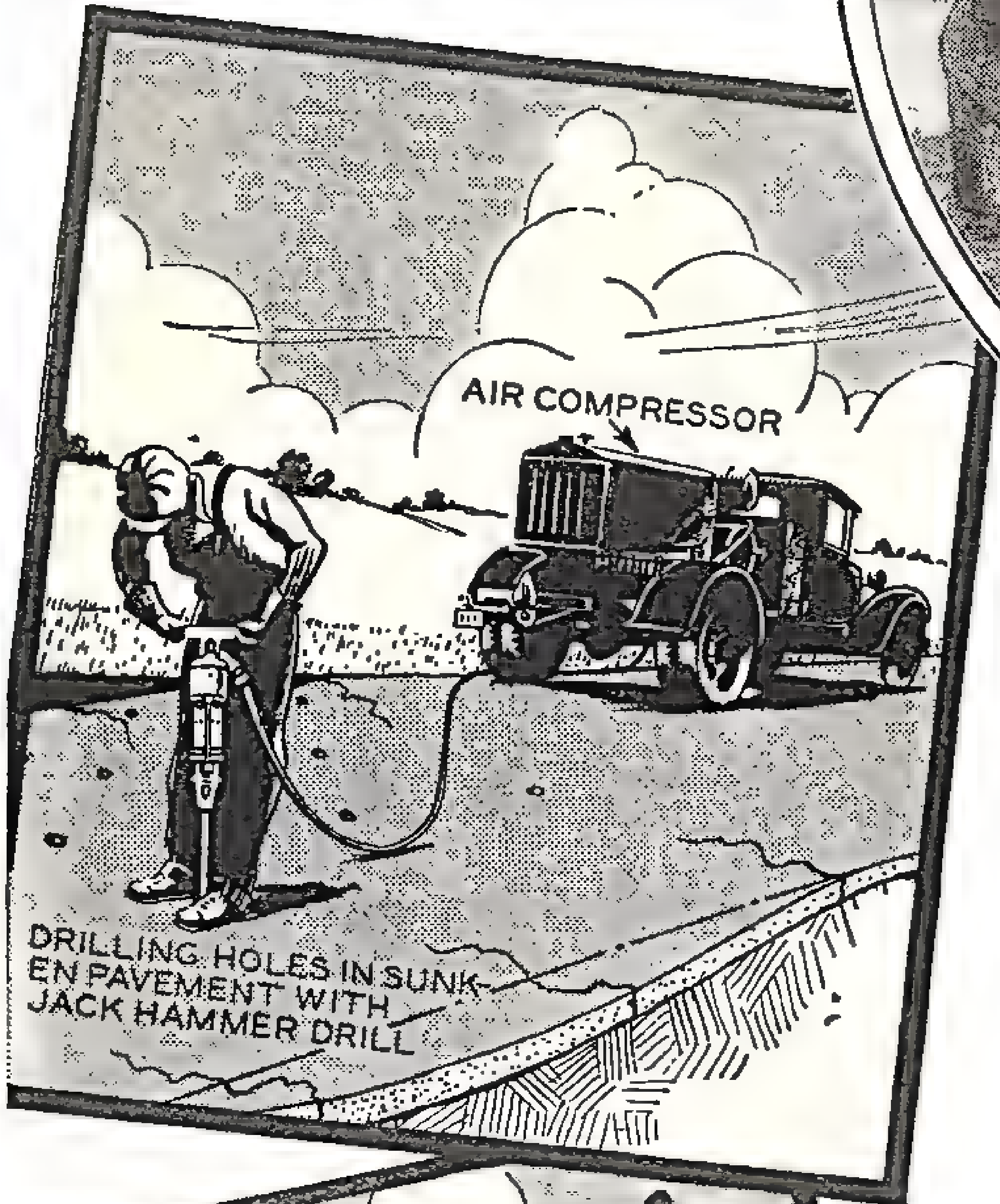
Wind tunnel tests show that Zapf's shell cuts down the wind resistance one-twelfth, which would mean economy in fuel and greater speed to the railroads. Zapf's shell has been tried out on a model train. When built for actual size equipment, it will have a flexible joint between the locomotive and tender. This will permit taking the curves without increasing the wind resistance.



Norman F. Zapf invented this shell to convert ordinary locomotives into streamline models for faster railroad service.

Engineers Repair SUNKEN HIGHWAYS *by* FORCING MUD *Under Pavements*

Highway engineers have solved the problem of repairing dips in heavily traveled roads by use of a machine which floats sunken pavement into place without disrupting traffic. Here is the story of the magic mud which makes our roads safe.


AIR COMPRESSOR
DRILLING HOLES IN SUNKEN PAVEMENT WITH JACK HAMMER DRILL

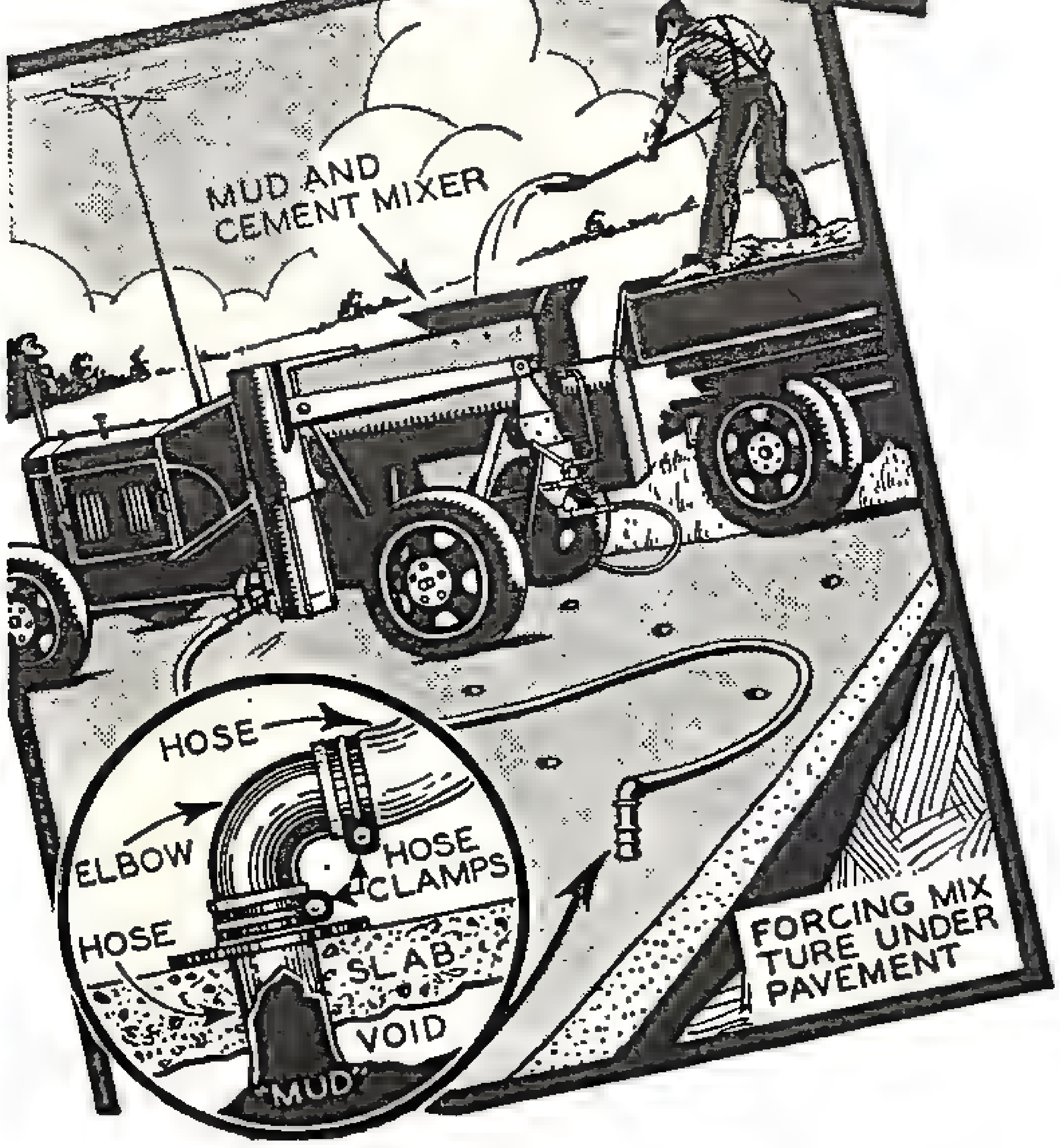


Photo above shows a highway crew in action preparing the mixture which is to be forced under the sunken pavement. The drawings at the left illustrate steps in the process. Lower panel is closeup of work done in photo.

DANGEROUS dips in the highway which menace high speed traffic are now eliminated by a machine which literally "pumps up" the sunken pavement to its normal level without disturbing traffic.

Hitherto the filling of depressions left by settlement of the pavement's subsurface through water movement or frost erosion meant detouring traffic while the concrete surface was reconstructed. The new method introduces a mortar under pressure beneath the concrete which floats the paving into place with a minimum of delay.

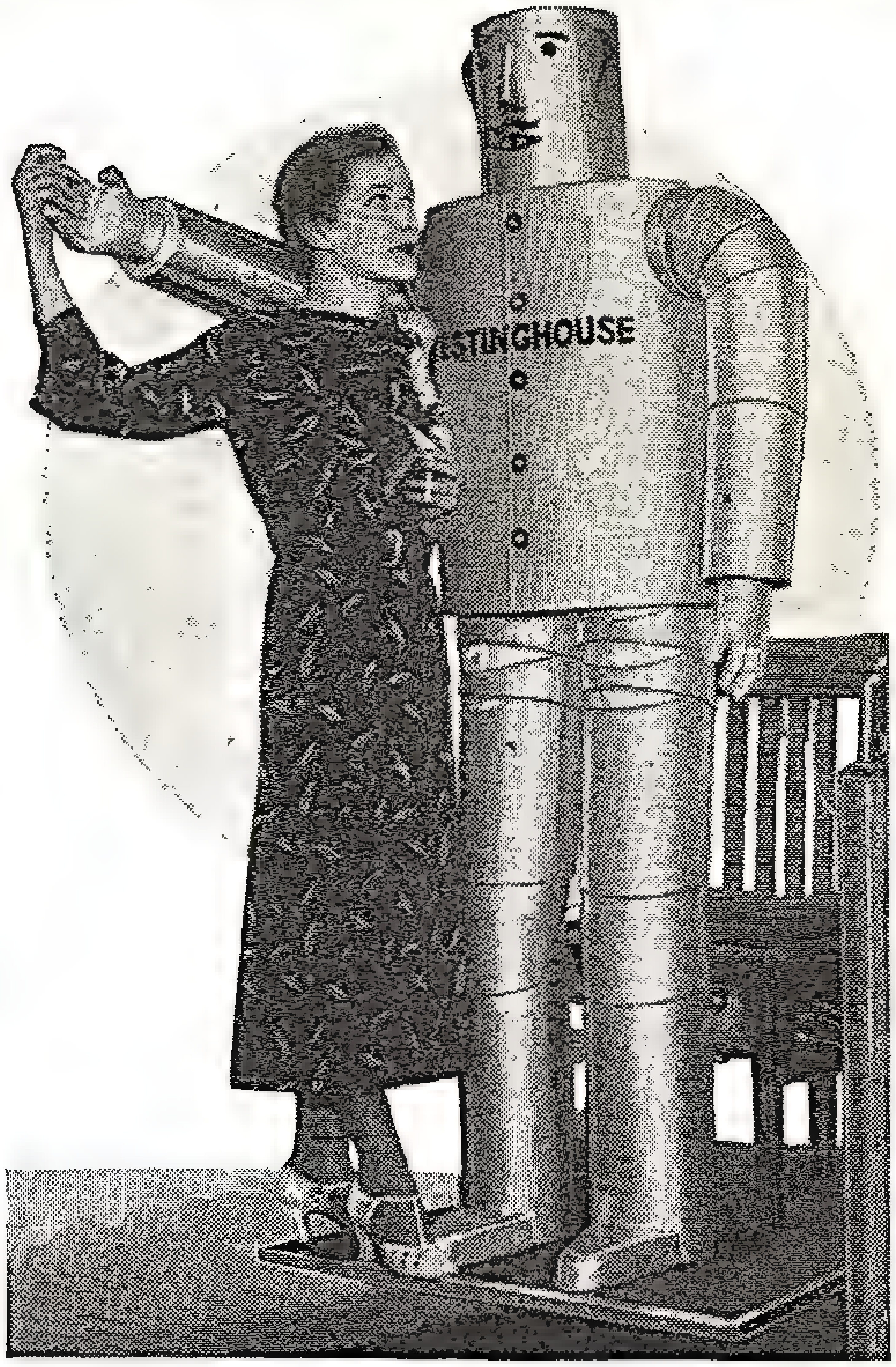
Air compressors mounted on trucks furnish the power for the pneumatic drills which are used to make holes in the slab to be raised. Dry black top soil and cement in the ratio of 20 to 1 are then reduced to the consistency of thick cream in a portable mixer and introduced under the slab at a pressure of about 100 pounds to the square inch. As the cement takes up water, the mixture swells forcing the slab upward.

The size of the dip is of no particular consequence, since tests have proved that depressions from one to eighteen inches can be raised with equal ease. Flat curves, built in the days of comparatively slow traffic, can likewise be elevated efficiently.

Mechanical "Willie" Combines Crooning With Housework

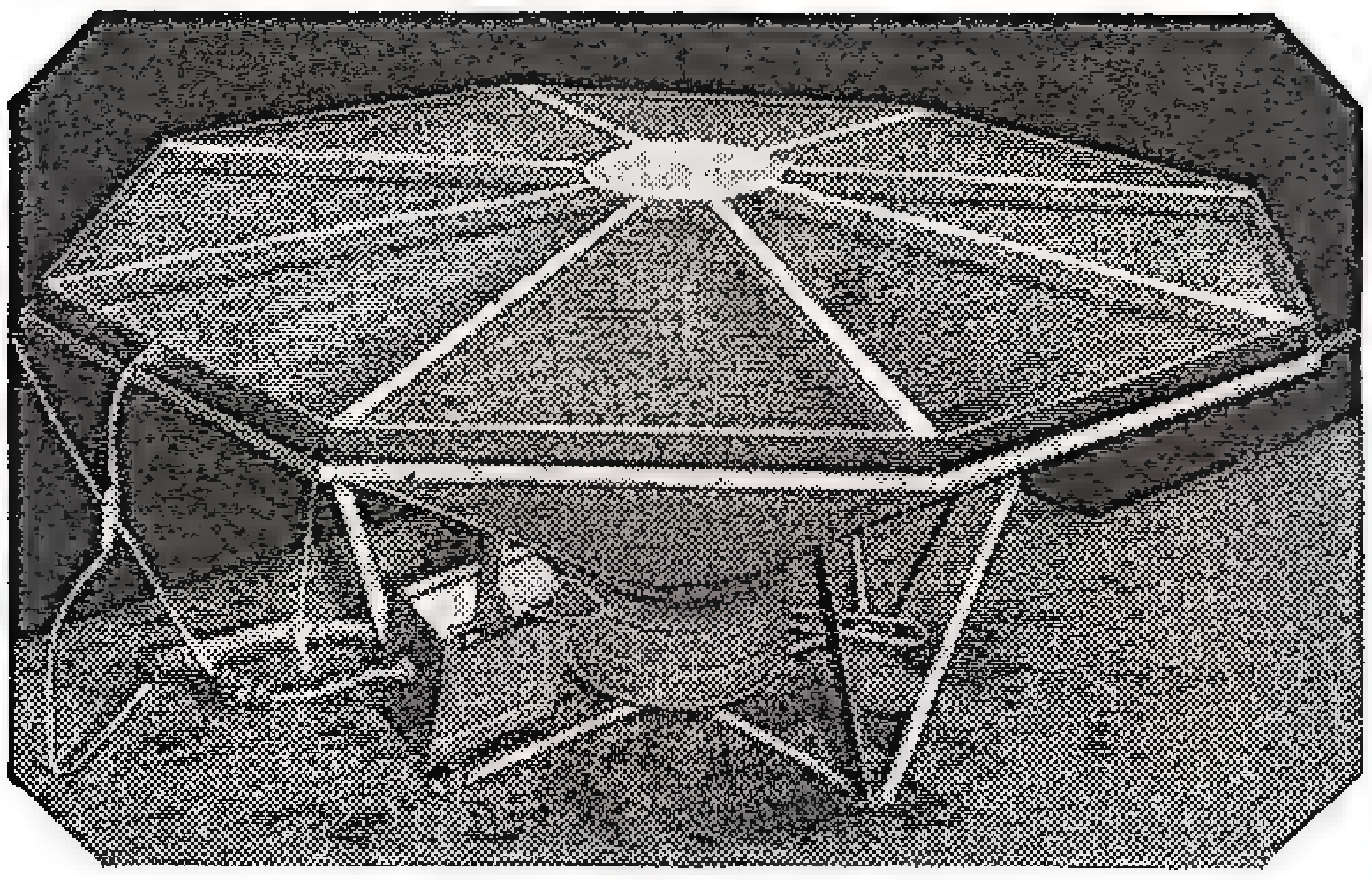
CROONING in a mellow baritone on command and manipulating a vacuum cleaner with almost human skill, "Mechanical Willie," laboratory robot, may prove a novel servant.

The product of Westinghouse engineers, Willie salutes, raises flags, smokes, sits, stands and bows at the operator's orders. Words spoken via a receiver are transformed by a photo electric cell into light beams which transmit impulses to his operating mechanism.



After demonstrating his mechanical and domestic abilities, Willie takes time off to indulge in a little sentiment.

Novel Device Electrocutes Flies

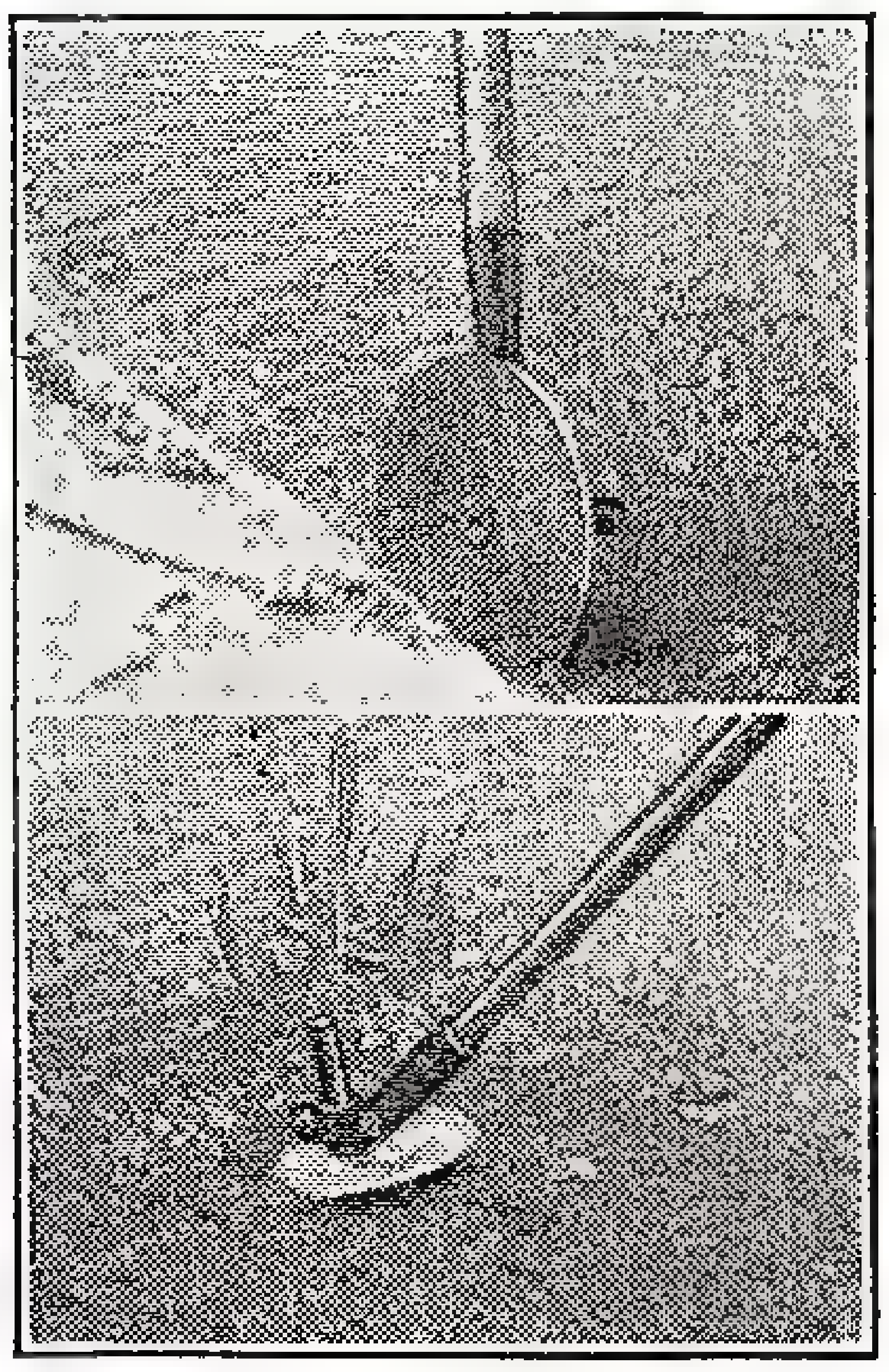


Lured by a can of molasses in center of screen, flies light on wires and are electrocuted by 60-volt power charge.

DECLARING war against the winged pests inevitably drawn to their plant, a California dairy company has recently installed an electric fly killer.

The device consists of an octagonal framework of wires laid over a funnel-shaped structure. A can of molasses in the center attracts the pests. They alight on the wires which carry a charge of sixty volts and are electrocuted on contact.

New Tool Weeds and Edges Garden



Above, edging turf along walk. Below, tool adjusted for weeds.

DESIGNED to reduce labor, a new garden accessory combines weeding and edging properties in a single disk tool.

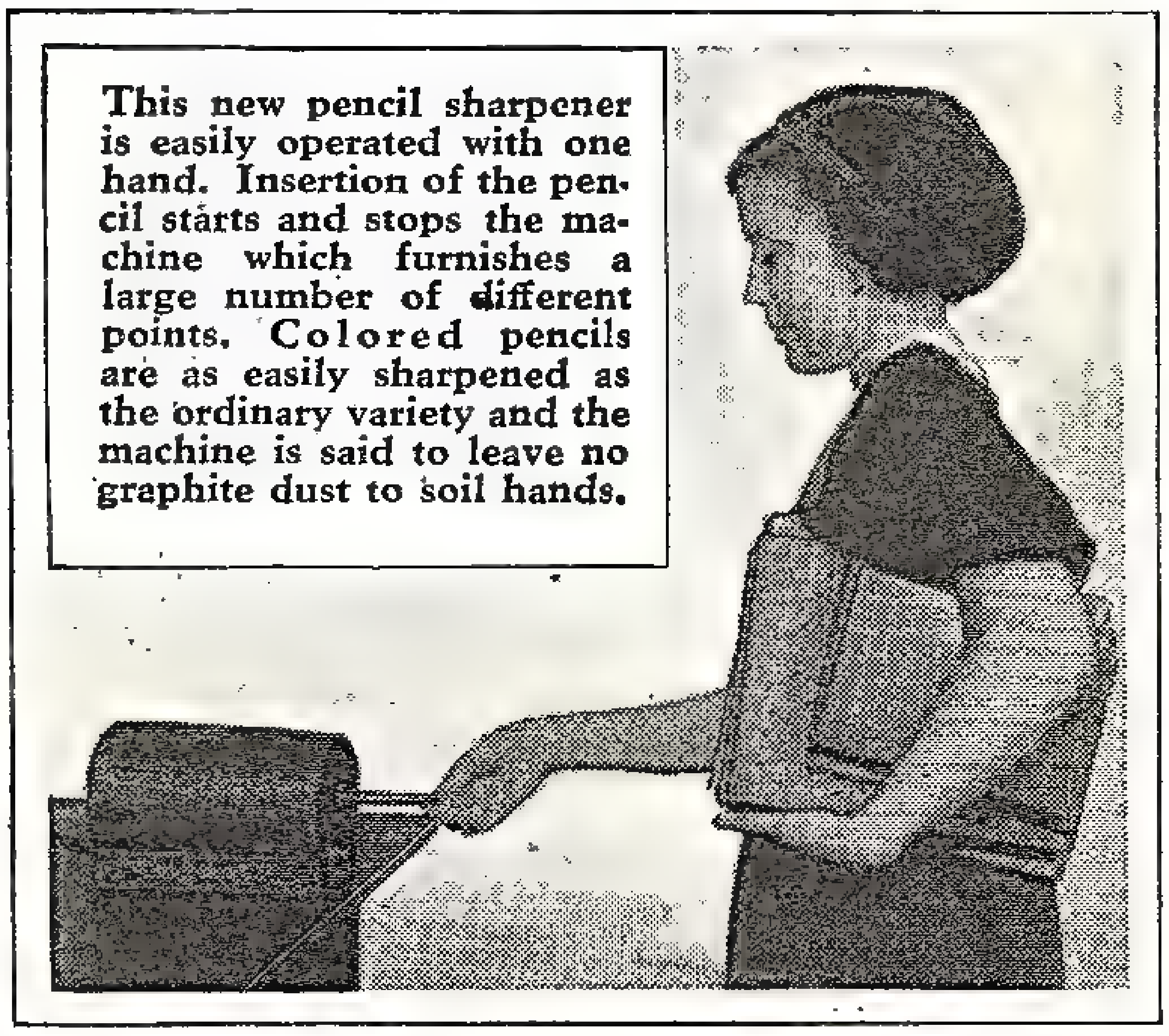
Used vertically, the device leaves a clean edge along walks and flower beds. Held parallel to the ground it destroys weeds as it cultivates the soil.

All adjustments may be made without use of tools.

Pencil Sharpener Is Automatic

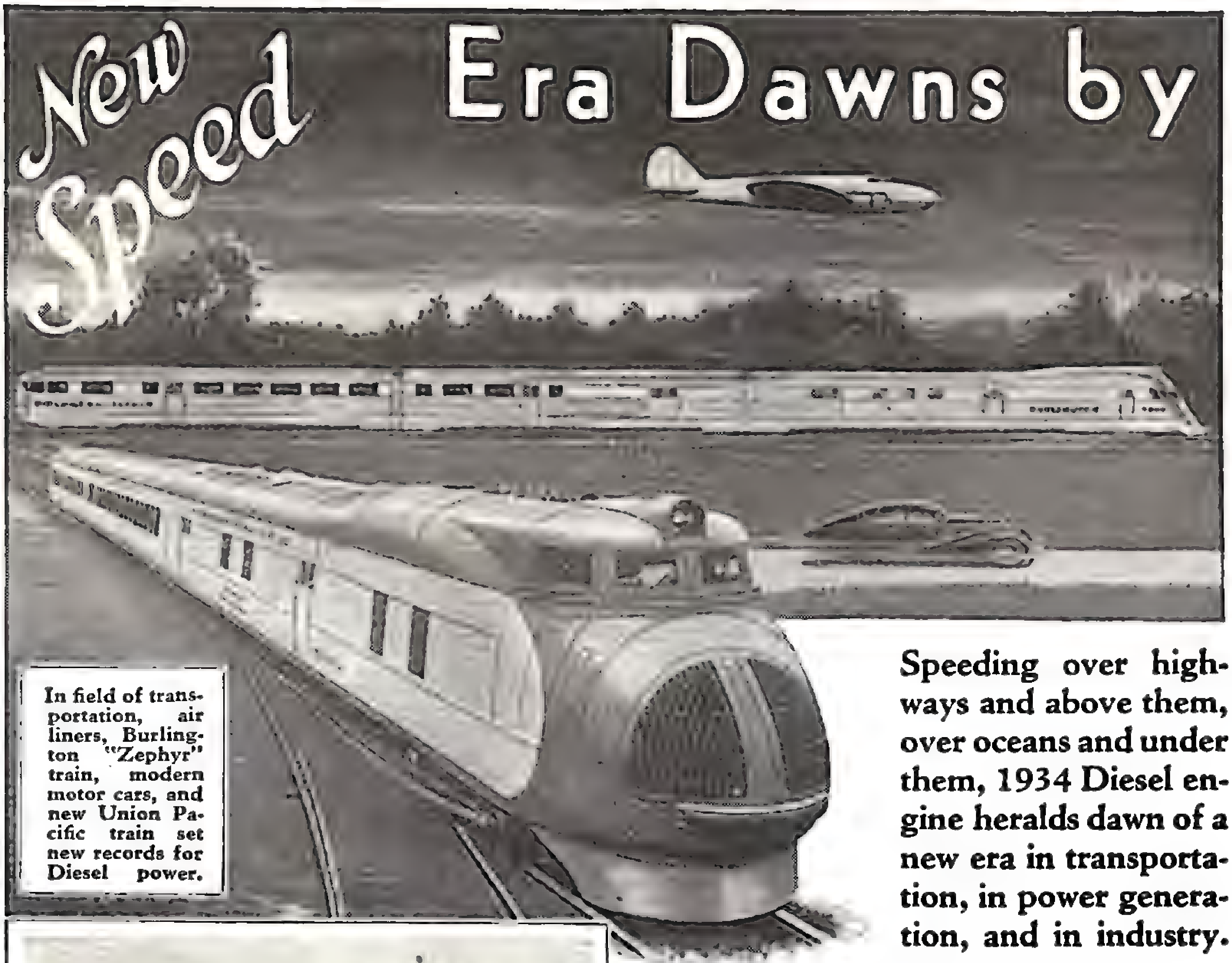
ENTIRELY automatic in operation, a new pencil sharpener is started or stopped by the insertion or removal of the pencil. Crowding or pushing will stop the finely powered motor before the point of the pencil can be broken.

Various kinds of points are obtainable, ranging from needle to stubby point in both common and colored pencils.



This new pencil sharpener is easily operated with one hand. Insertion of the pencil starts and stops the machine which furnishes a large number of different points. Colored pencils are as easily sharpened as the ordinary variety and the machine is said to leave no graphite dust to soil hands.

New Speed Era Dawns by



In field of transportation, air liners, Burlington "Zephyr" train, modern motor cars, and new Union Pacific train set new records for Diesel power.

Speeding over highways and above them, over oceans and under them, 1934 Diesel engine heralds dawn of a new era in transportation, in power generation, and in industry.

by ROBERT FAHERTY

THE Diesel era is arriving! Under high compression and with swift, sure strokes the Diesel engine is pounding its way into all corners of the world, bringing new speed and power to industry and to transportation.

The lowly "rational heat motor" patented by Dr. Rudolf Diesel in 1892, and considered an outlaw among engines for almost a score of years afterward, has today become a multitude of different Diesel types, all revolutionizing their respective fields in industry.

"The Diesel has got to come," says Henry Ford, as he experiments in his Fort Myers, Florida, workshop with some new idea for a Diesel engine. "I do not know or care in just what shape, but it is our business to find out."

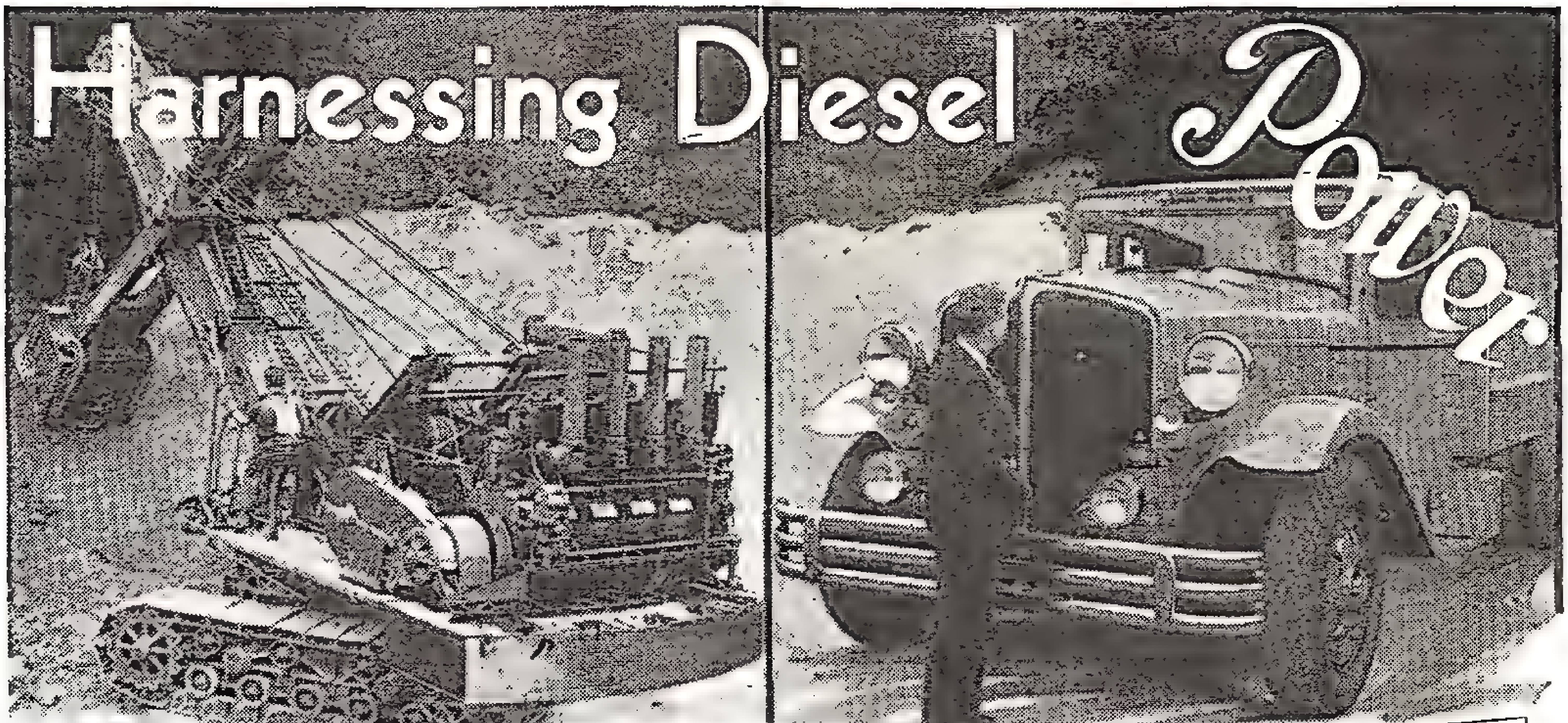
Early Diesel engines were crude and bulky, suited only for stationary installations in power plants or perhaps on large ships. Modern engineering research has developed this first oil engine with swift progress to the point where, today, the Diesel engine is breaking new speed and power records on every hand.

The Diesel is an internal combustion engine without spark plugs. Air is compressed

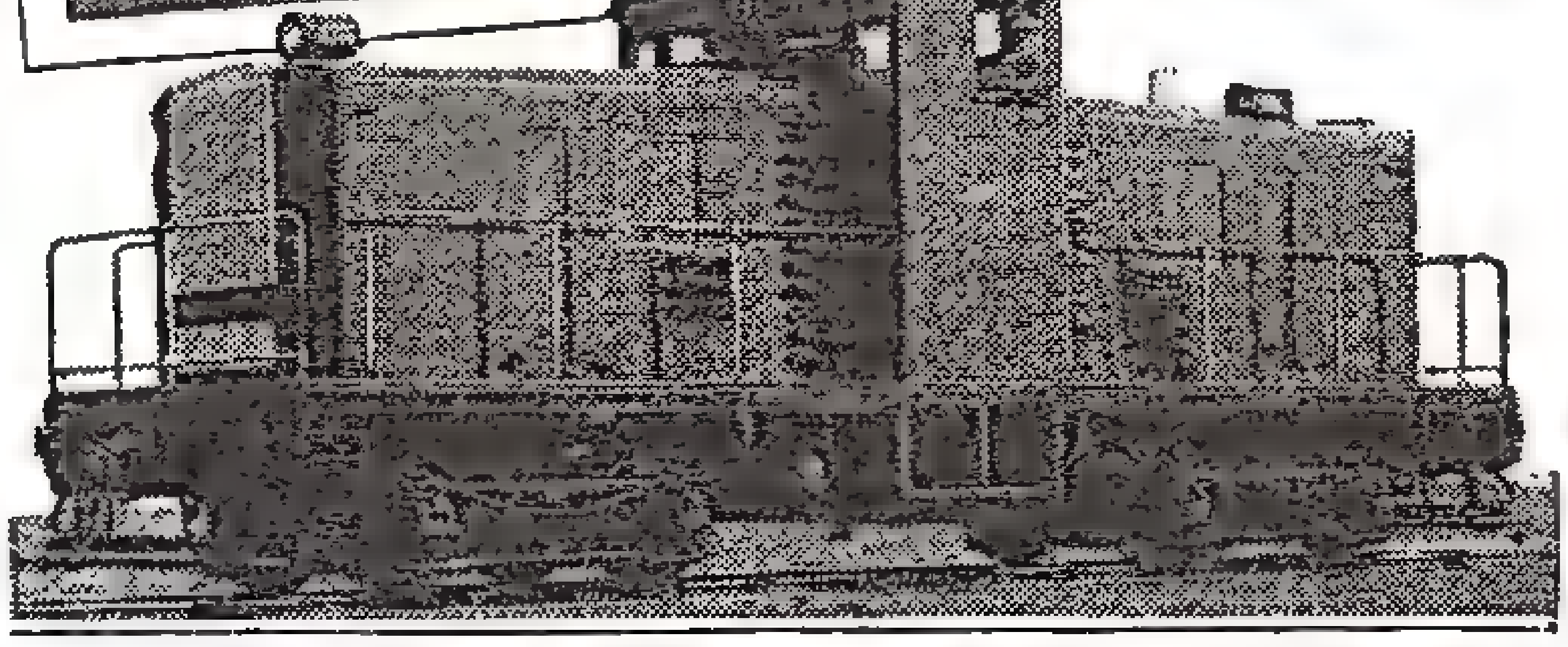
Italy's Augustus, largest motorship in the world, has traveled for years under Diesel power.

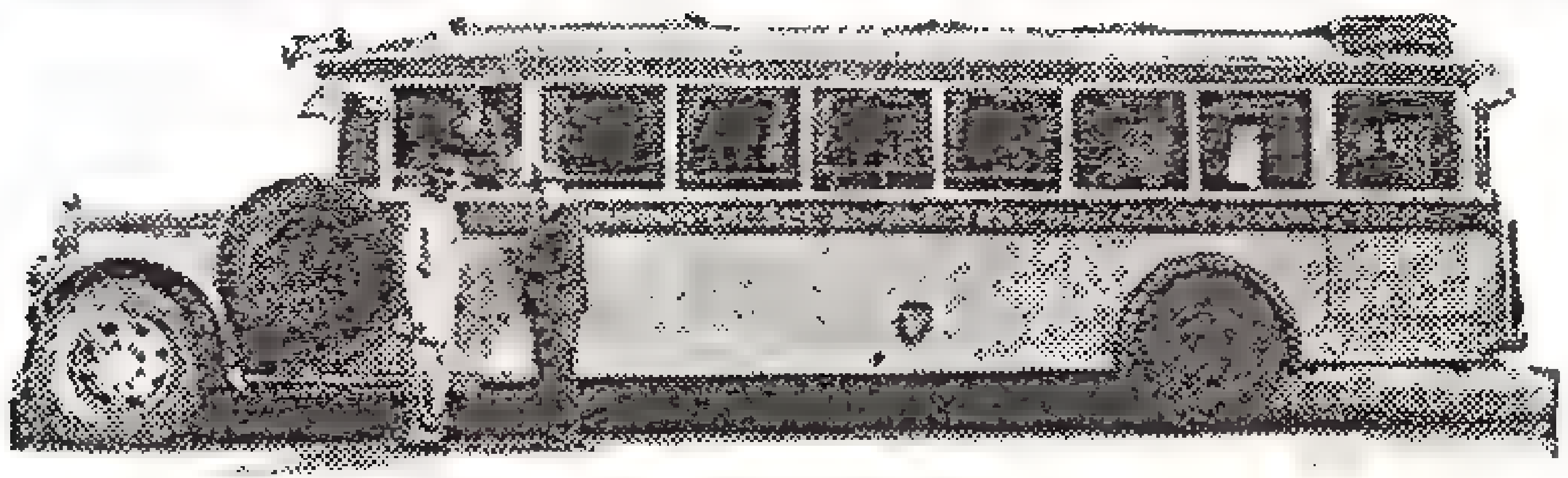
This Sterling crankless Diesel is designed chiefly for small marine craft. Direct-drive engine has low weight, high speed, and large power of gasoline engine. Cylinders are horizontal, permitting much lower engine construction. Low center of gravity makes engine ideal for war tanks, for powering gun carriages, and for autos. As in most Diesels compressed air in small pressure tank is used for starting.

Harnessing Diesel Power



Conventional Diesel engine pictured at right is harnessed in many ways to supply power needs of industry. Power shovels, huge motor trucks, freight locomotives, and cross-country busses all herald the dawn of the Diesel era. New starter equipment permits Diesels to be used anywhere.





in the cylinders to pressures of from 375 to 600 pounds per square inch. So great is this compression that the air inside is heated to over 500 degrees Fahrenheit.

Fuel oil sprayed into this heated air immediately explodes. The easy ignition makes possible the use of crude oil or other cheap oil refining residues.

Larger Diesels can operate on cruder oil than can the light, high-speed Diesels used for transportation purposes. The cost of fuel therefore varies, but it is always less than that of kerosene or gasoline.

Railroads Use Diesels

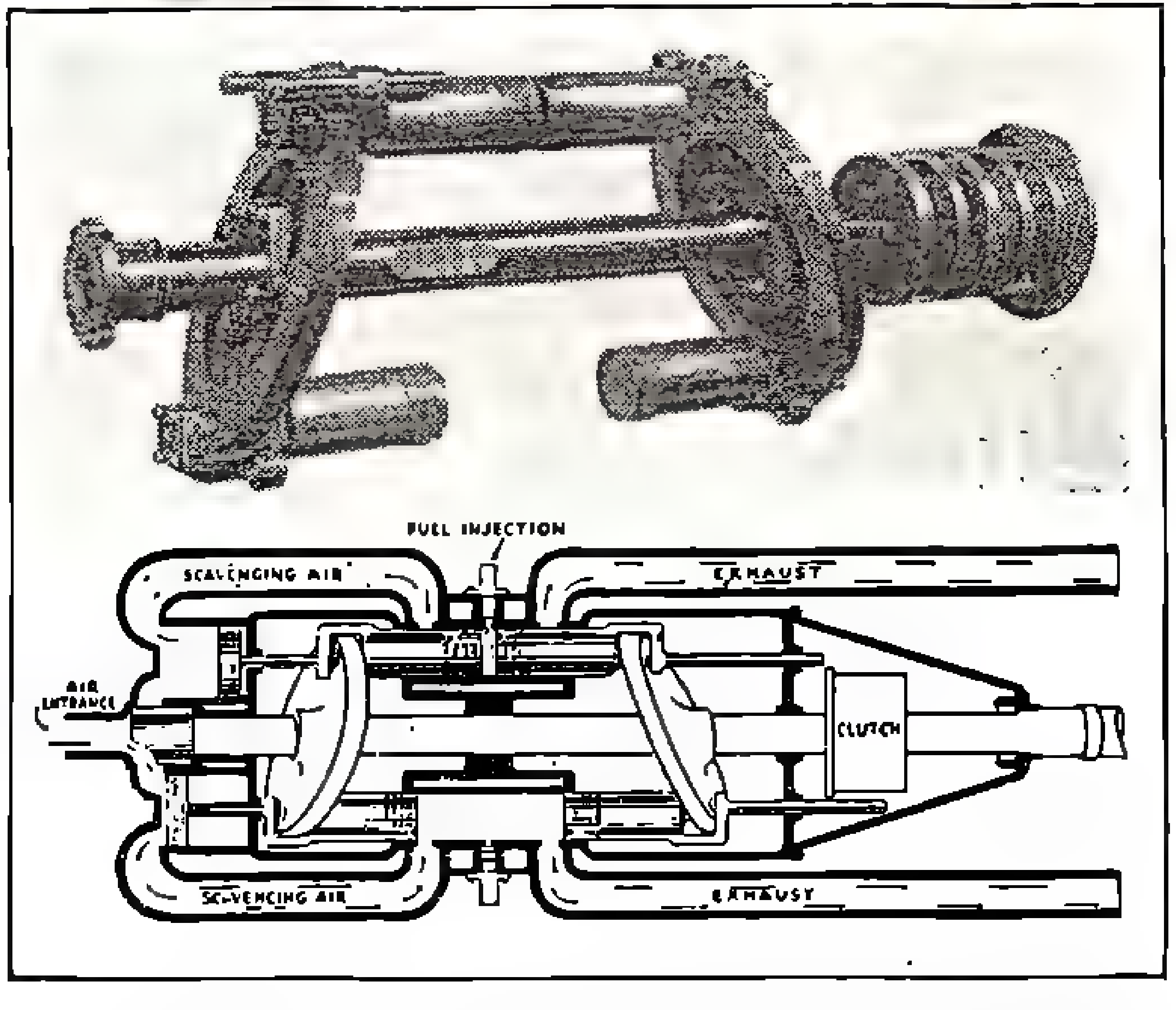
The Diesel engine is now coming into its own in the field of transportation. Railroads are putting out high speed, Diesel-powered trains with latest of modern conveniences in a determined attempt to regain traffic lost to the busses and to automobiles.

The Burlington "Zephyr," an ultra-modern and stream-lined three-car train, depends on an 8-cylinder, 600-h.p. oil-burning Diesel for its absolutely safe cruising speed of over 100 miles an hour.

The second of Union Pacific's "Trains of Tomorrow," now being completed, will use a 12-cylinder V-type Diesel. The first of these trains, though powered with a 600 h.p. distillate-burning engine, has already set new records for speed and economy of operation in its exhibition tours of the country. With Diesel power the train can carry enough fuel for a 1,200-mile run. An ordinary steam locomotive must re-coal every 100 miles.

A small Diesel in the new streamlined railcar of the Great Western Railway in England gives almost entirely automatic

(Continued on page 120)



Top diagram shows relative positions of opposed pistons and tilted discs of new Sterling crankless Diesel. As many as six cylinders may be grouped around disc. Special bearings convert back and forth motion of pistons into rotary motion of drive shafts at each end of engine. Below: Arrangement of intake and exhaust manifolds is simple.

Electric Muffler Warms Open Car Driver

Discomforts of open car motoring are eliminated with this electric muffler, which wearer is shown attaching to dash.

MOTORISTS who enjoy driving an open car, yet are subject to throat colds from exposure, are assured comfort with a new electric muffler recently invented by a Los Angeles man.

In appearance the muffler resembles the conventional models; but woven into its fabric is a cleverly devised heating unit which effectively dispels the chill breezes.

Electric current for the device is supplied by the battery of the car. An extension cord attached to one end of the muffler plugs into a convenient socket on the dashboard. Little current is consumed and comfort is assured on the coldest days.

Gadgets Create New Form of Art

TIN funnels, microphones and similar mechanical gadgets were used to create a new form of "synthetic" art in a one-man show recently held in New York City.

Choosing such well known men as Floyd Gibbons and the Prince of Wales for his subjects, the artist achieved some unusual results in his strange medium. Gibbons' news-seeking ears were pictured as funnels, his mouth as a microphone and his head a jumble of miniature telegraph wires, guns, war ruins, and Mexican souvenirs—all symbolizing Gibbons' famous career.

The Prince of Wales, generally known as a "good egg," was pictured with an egg-shaped face, decorated with pieces of harness, haberdashery and other symbolical devices.

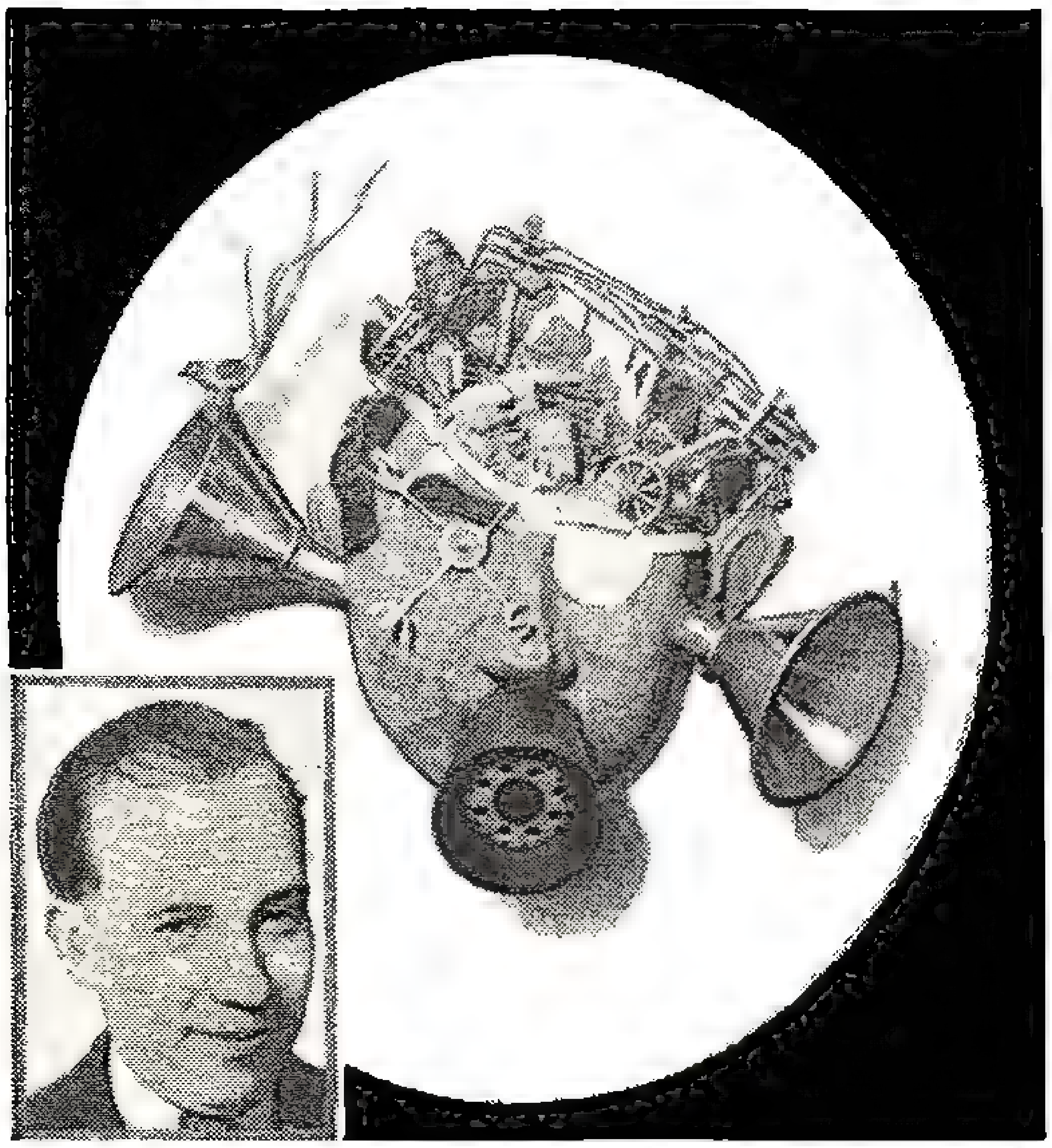
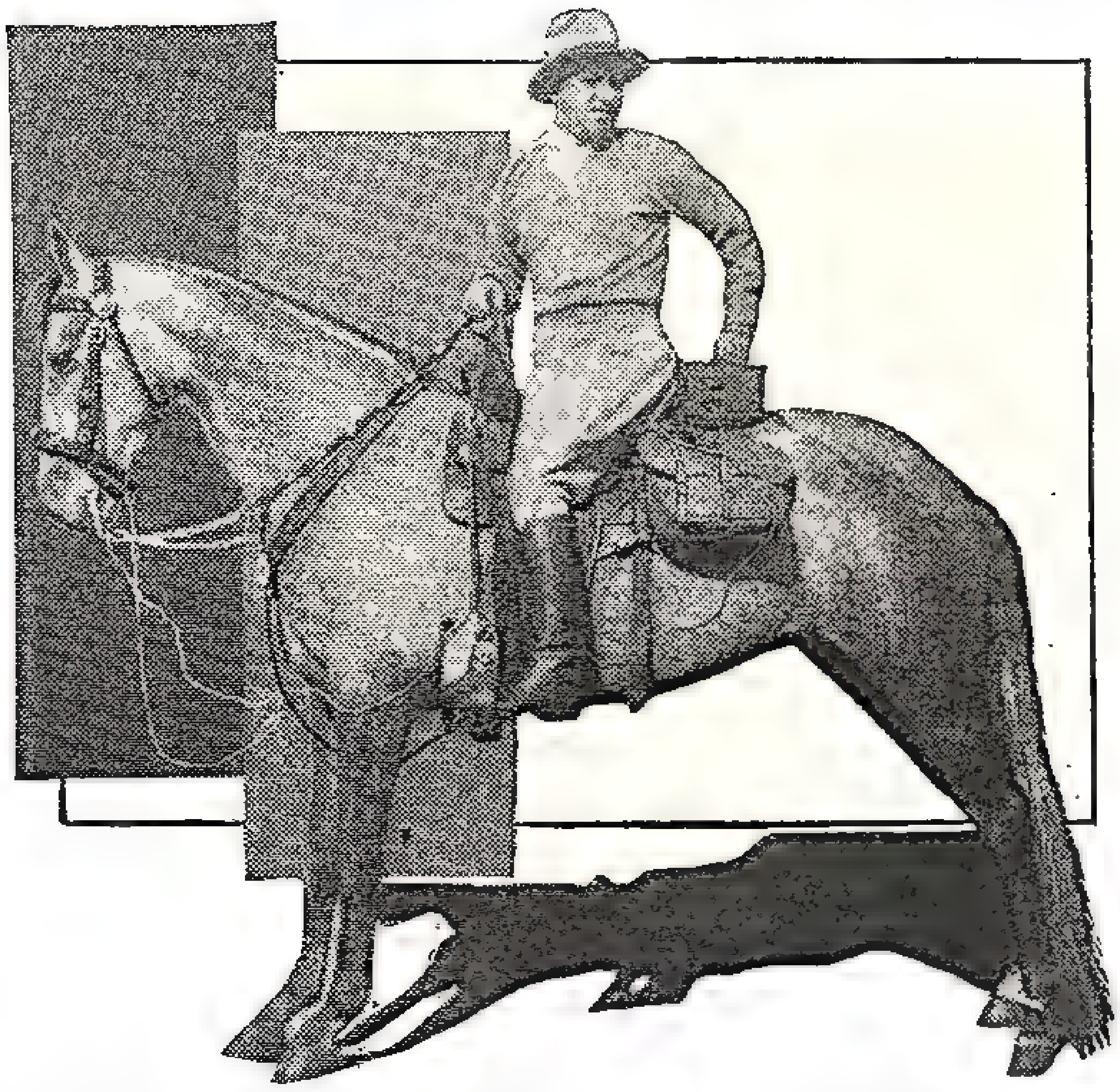


Photo shows a "synthetic" picture of Floyd Gibbons, noted radio and news star. Insert, Ted Weidhaas, artist-inventor.

Horse's Bit Is Radio Antenna



A Chicago radio executive tunes in his favorite program as he sets off for a canter. Batteries are in saddlebags.

UNWILLING to miss some of his favorite programs while on the bridle path, a Chicago radio executive devised a horseback radio set which uses the animal's bit as an antenna. The set, which has proven unusually satisfactory, is mounted directly behind the rider. Electric power is furnished by batteries carried in twin saddlebags.

Paper Picnic Cups Have Handles

SMART paper cups equipped with handles are among the newest picnic accessories. They solve the hot coffee problem handily and may be discarded after using.

Handles on paper cups now permit safe handling of hot liquids.

New Automatic Device Answers Phone, Records Message

PAUL H. ROWE, a Los Angeles sound engineer, has perfected a nearly human robot that answers his telephone perfectly when he is out.

The ringing of the telephone bell starts this ingenious machine operating, and whatever the caller says is received by a microphone and recorded. When Rowe returns, he is able to listen to whatever messages have come in.

Paul H. Rowe demonstrating his ingenious telephone robot which takes and records messages phoned in his absence. He predicts these machines will soon be in wide use.

Expert Tastes Soap for a Living

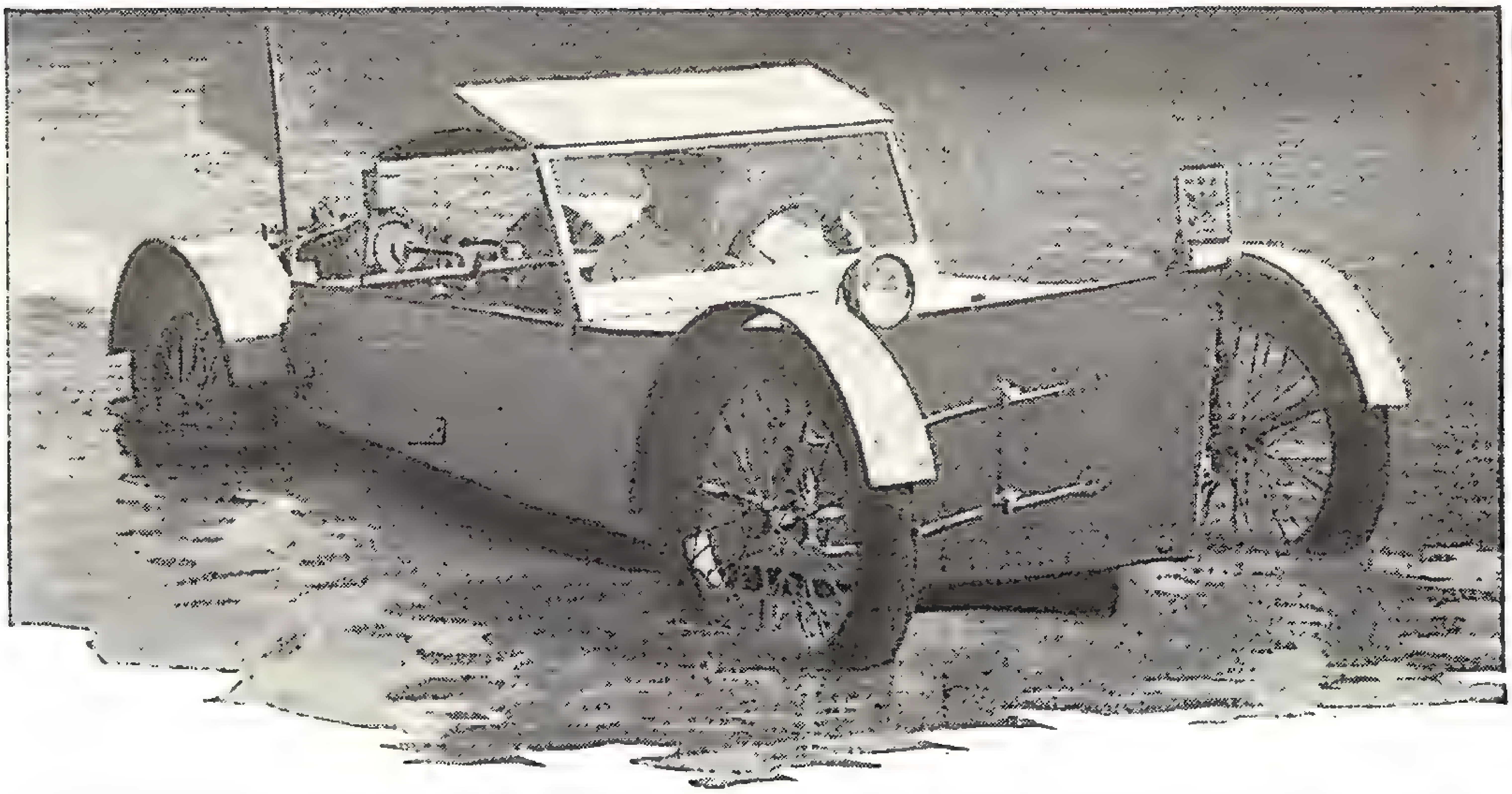
Photo shows expert testing soap by tasting sample from caldron.

TESTING soap by taste is one of the chief duties of Joseph Strobl, chief soap maker for a Los Angeles company. He samples the cooking product much like an expert chef. Chemical tests take too long at critical stages and are said to be less accurate than Strobl's tongue.

Auto-ship Runs on Land or Water

A PRACTICAL amphibian run-about has been designed and built from odds and ends by a California man, who has made several successful trial runs with it on highways and waterways near Sacramento.

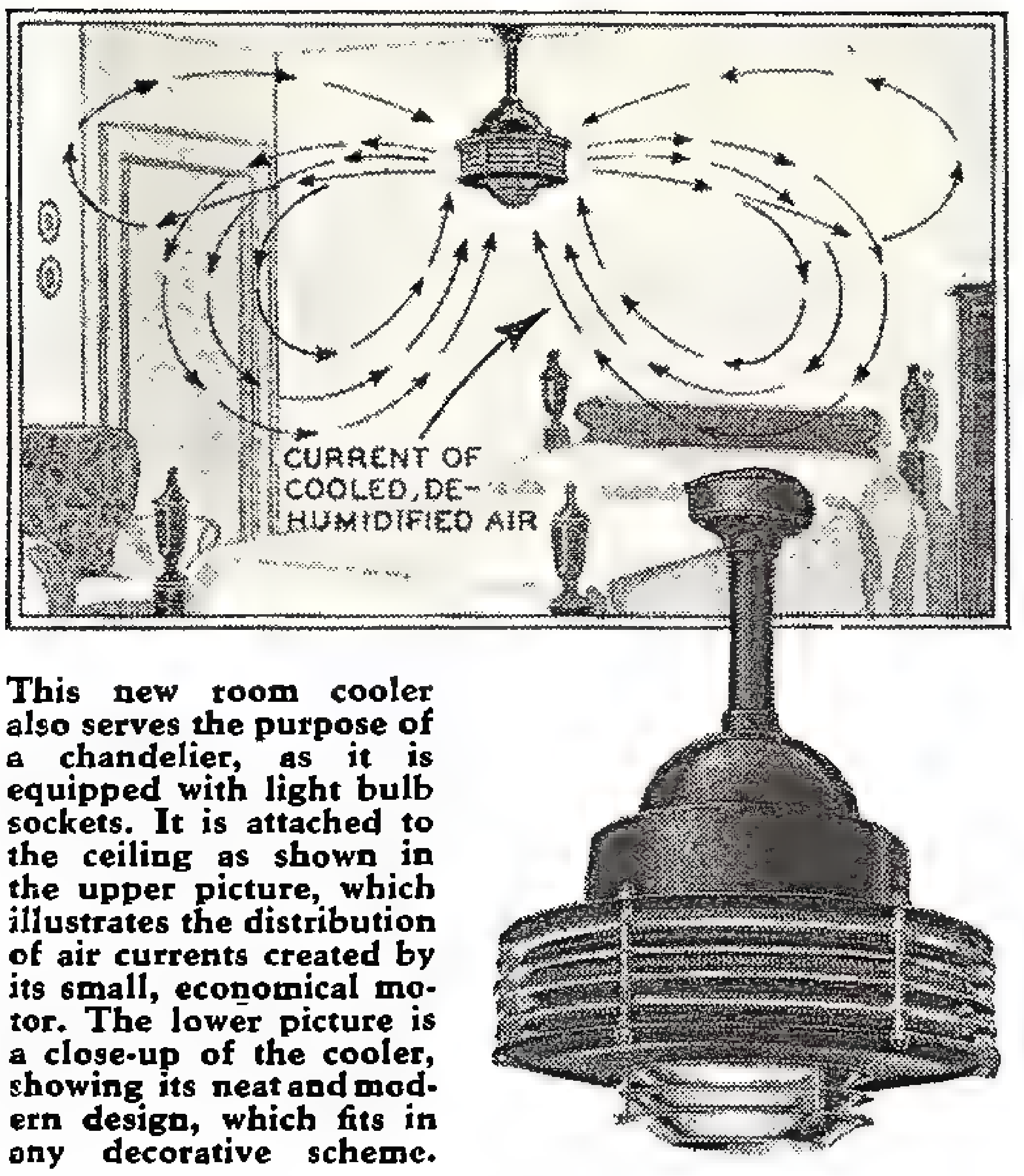
In the water it is driven by a motorboat propeller, and on emerging the power is transferred to the rear wheels. Power is supplied by a two-cylinder, eleven horse power motorcycle engine, equipped with a fan for cooling at the high r.p.m. attained when the propeller is used. The vehicle is steered like a common automobile.



This unique amphibian, made by William Faulkner of Sacramento, Cal., from odds and ends of automobile and motorcycle parts, can travel twelve miles an hour on water, and reaches a speed of about fifty miles an hour on land.

This New Room Cooler Looks and Acts Like a Chandelier

A ROOM cooler and dehumidifier which looks like an ordinary compact chandelier—and also serves that purpose too—is the latest aid to comfortable living, and introduces an entirely new principle in room cooling. The chilled air is forced out in a horizontal direction and allowed to drop of its own weight, instead of being blown out at high speed from a point at or near the floor, as is the case with most cooling outfits.



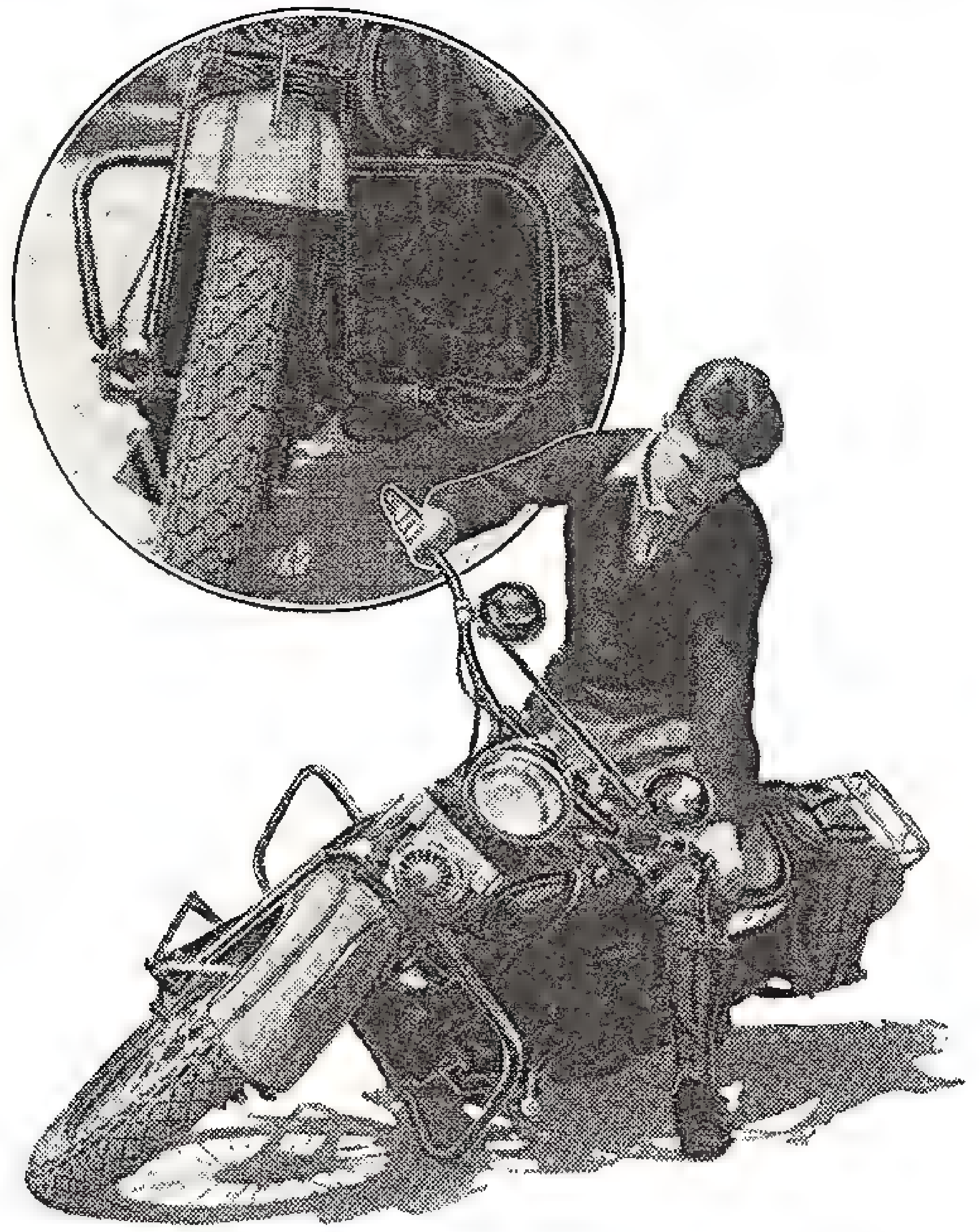
This new room cooler also serves the purpose of a chandelier, as it is equipped with light bulb sockets. It is attached to the ceiling as shown in the upper picture, which illustrates the distribution of air currents created by its small, economical motor. The lower picture is a close-up of the cooler, showing its neat and modern design, which fits in any decorative scheme.

Compressed Gas New Motor Fuel

GASOLINE as a motor fuel will be supplanted by compressed gas if the invention of Dr. C. Walter, an Englishman, becomes popular. Dr. Walter, after years of experiment, recently succeeded in perfecting a method for using gas stored in small tanks under high pressure to run his 20-h.p. Rolls Royce. On the trial trip, he proved that his invention had a double advantage when he hooked up one of his gas supply tanks to an ordinary ring burner and prepared tea by the roadside. A special carburetor mixes gas with air.

Dr. Walter shows how easy it is to prepare tea by the roadside if your car is one that runs on compressed gas.

Guards Reduce Motorcycle Injuries

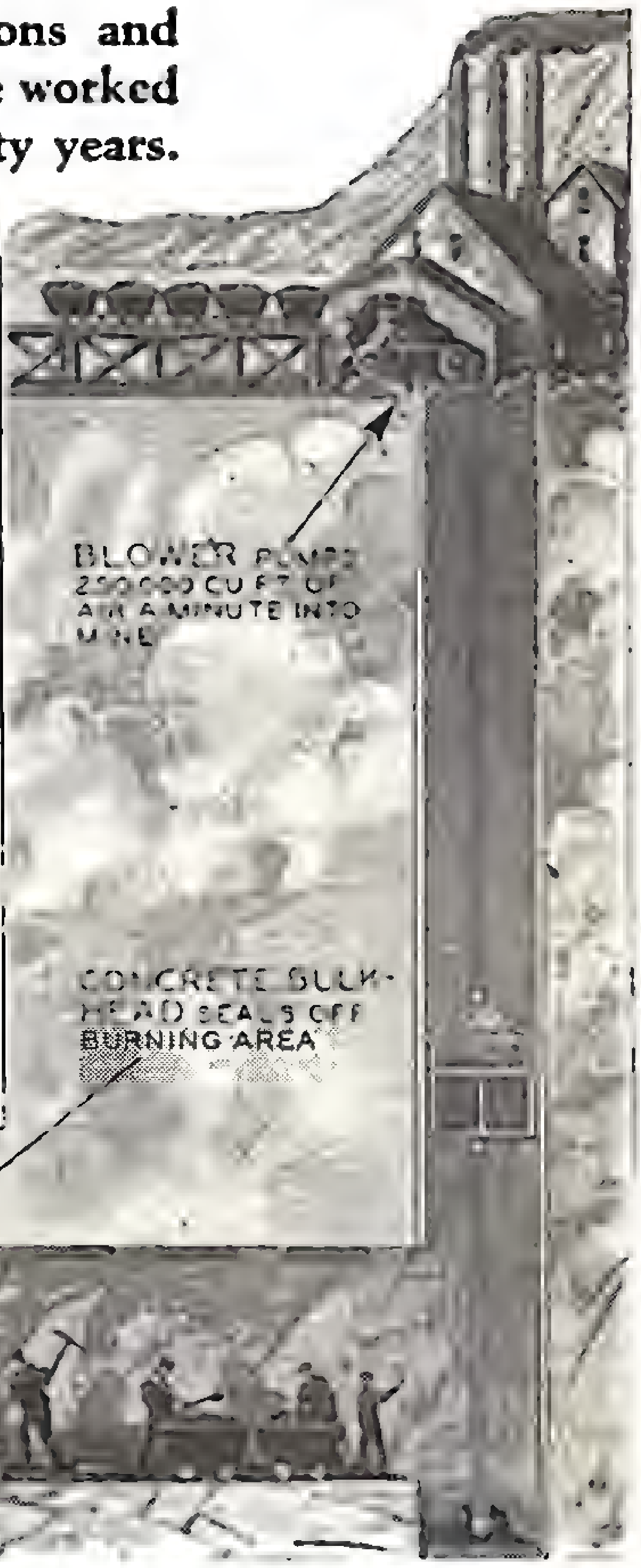


These new wing guards attached to the front frame of a motorcycle were developed for the Minnesota state police in an effort to reduce the number of motorcycle injuries.

BROKEN legs and other injuries which result when a speeding motorcycle skids and overturns can be largely prevented by the use of new guards perfected for the use of the Minnesota state police. Made of strong, hollow steel tubing, they are attached to the front frame of the motorcycle on either side, as shown in the pictures above. When the motorcycle falls over sideways, these guards protect the driver's legs and bear the brunt of the shock. They also serve the purpose of stopping the machine when it begins to slide along the ground, thus eliminating some of the danger of severe abrasions suffered by drivers who are dragged sometimes a distance of a hundred feet or more. The guard "wings" may be folded back flat against the frame when they are not wanted, and can be instantly opened out again when on a hazardous chase.

Fight Fire 40 Years to Work Burning Mine

Braving the dangers of cave-ins, explosions and super-heated temperatures, hardy men have worked a burning copper mine in Arizona for forty years.


BLOWER PUMPS 250,000 CU FT OF AIR A MINUTE INTO MINE
CONCRETE BULKHEAD SEALS OFF BURNING AREA
BURNING MINE TEMPERATURE 1200°

Above—A view of the open pit of the burning mine at Clarksdale, Arizona, showing fumes issuing from ground. Right — Artist's drawing showing in simplified form how the underground crews are protected from the menace of the flames by concrete bulkheads walling off the fire.

RAGING with varying degrees of intensity, a fire has burned in an Arizona copper mine for forty years; yet it has remained in continuous operation despite the menace of the unconquerable flames.

Located in Clarksdale, Ariz., the affected area involves more than 5,000,000 tons of copper ore. During the four decades since the fire started in 1894, many lives have been lost, directly or indirectly, as a result of the flames which have heated the rock to 1200 degrees.

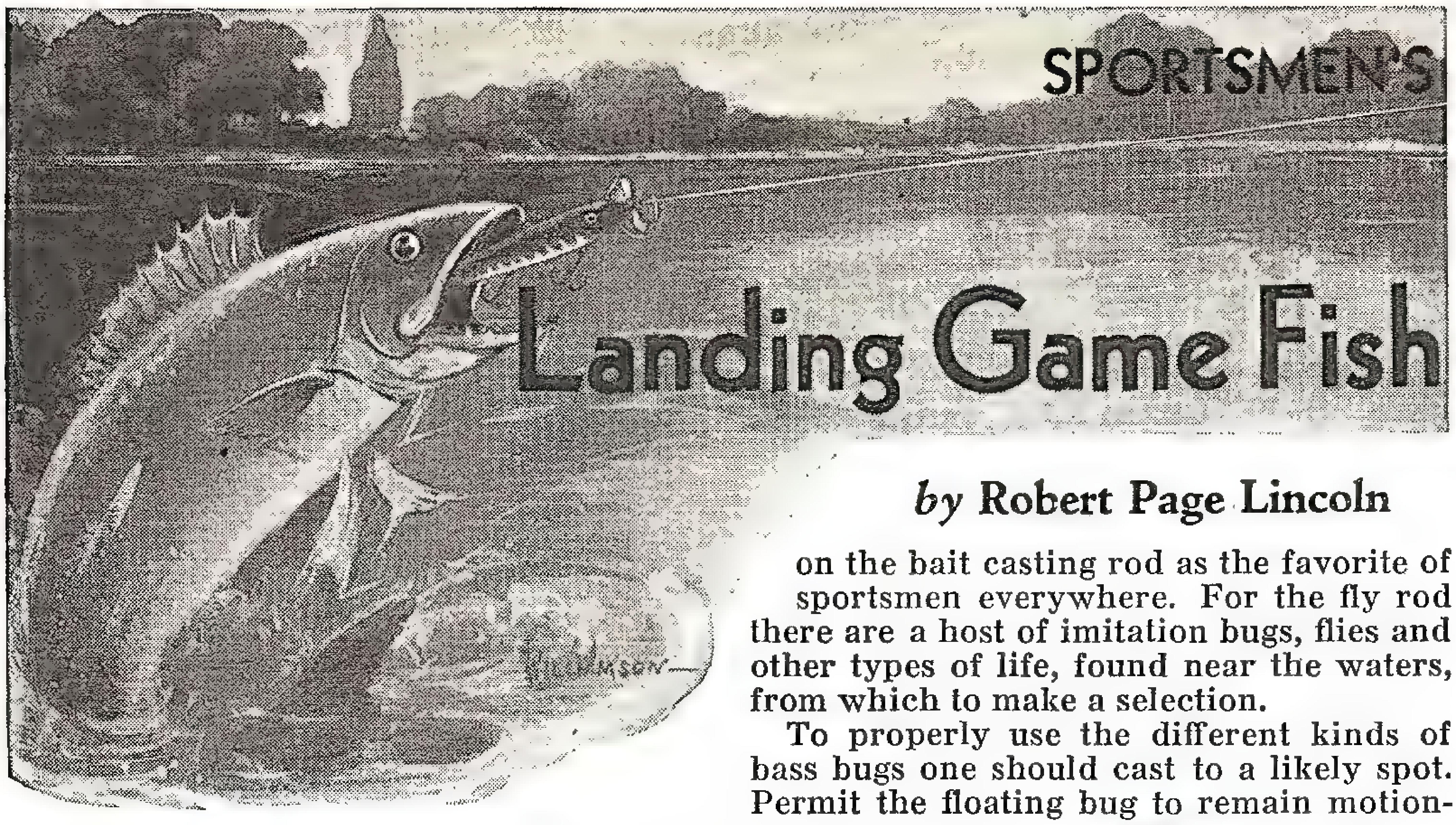
The fire originally started on the 300-foot level at a time when large quantities of timber were used for shoring purposes. A large body of ore caved in, producing sufficient friction to ignite the timber props and later to fire the sulphur in the copper ore. Since that time the mine has burned, bursting into raging flames in some sections and smoldering under a slow state of oxidation in others.

Faced with the menace of a fire that could not be controlled, less hardy men might have abandoned the mine and suspended operations; but the Arizona workers would not admit defeat.

An elaborate system of ventilation was promptly evolved. Fresh air was forced under pressure into the area, driving the combustion gases back into the broken and caved ground. With the working rooms free of gas, operations were resumed. High temperatures prevailed and miners were forced to wrap dynamite in asbestos to forestall accidents.

Eventually this method proved too expensive and the burning area was sealed off with concrete bulkheads down to 1000 feet. Operations since then have been conducted largely above the affected area.

Yet mining also continues underground. Watchmen patrol all timbered areas constantly. Fresh air is supplied by a machine which pumps a quarter-million of cubic feet every minute of the working day. The temperature of the air in the working rooms is tested frequently and water is applied whenever there is the slightest suspicion of heating.



SPORTSMEN'S

Landing Game Fish

by Robert Page Lincoln

ARTIFICIAL lures have become so popular that they have practically replaced live bait with sportsmen. These plugs, bugs, flies and spoons have increased in numbers so greatly that there literally are thousands on the market.

Indeed each of these lures has some merit and in most cases proves more killing than many a live bait. The fisherman now has hundreds of patterns from which to choose and without a doubt can find a lure to resemble any of the live types.

Lures Should Imitate Live Bait

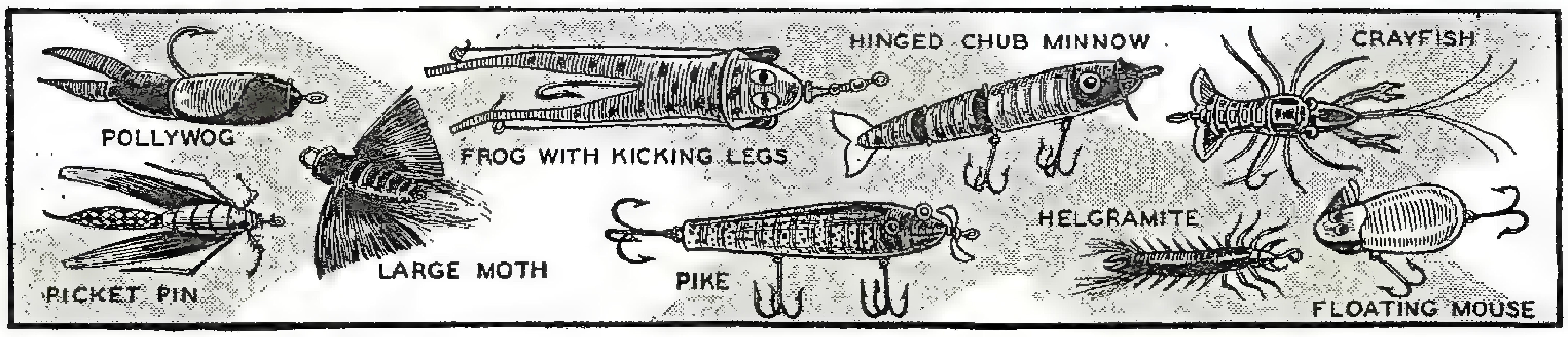
Sportsmen who claim that this or that lure is useless in tempting game fish often are mistaken. Usually the difficulty lies not with the lure, but with the fisherman's manner of handling it.

It must be remembered that a lure usually is intended to imitate some form of life sought as food by fish. To properly use such a lure, therefore, the fisherman must, as nearly as possible, imitate the actions of the artificial bug, fly, minnow, or animal he is using so as to completely fool the wary denizens of the streams and lakes.

Artificial bait is either of the underwater or floating type. So popular has the latter become that the fly rod is rapidly gaining on the bait casting rod as the favorite of sportsmen everywhere. For the fly rod there are a host of imitation bugs, flies and other types of life, found near the waters, from which to make a selection.

To properly use the different kinds of bass bugs one should cast to a likely spot. Permit the floating bug to remain motion-

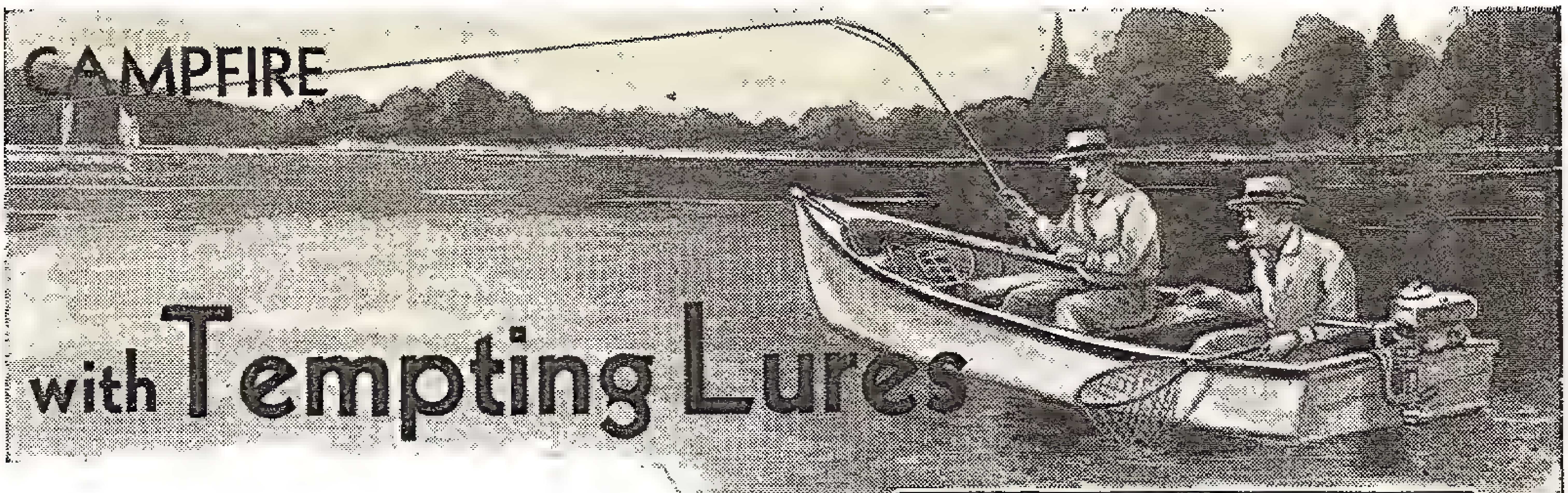
Here the author displays bass caught with artificial lures.



A few of the popular lifelike lures are shown above. There are a great variety of others that are equally effective for hooking game fish. All types of life eaten as food by fish are being imitated. The sizes vary for different fish.

CAMPFIRE

with Tempting Lures



Hundreds of lures are available to the fisherman. The problem is to use and select them effectively. An ace of anglers here tells you just how to get good results with artificial bait.

Big muskelunge, like the one shown above, are taken with large-size minnow imitations and spoons. This Rainy River guide landed this monster in White Fish Bay, Minnesota.

less for a few moments on the water. This will give the bass, who may have noted the drop of the lure, time to inspect it. No strike occurring, move the bug forward a few inches. If the bass fails to dart at it, again let the bug remain motionless when he may seize it. Repeat the procedure a third time. If it fails, cast to another spot. The writer has found this one of the most successful ways of using the bass bug.

When to Set Hook for Bass

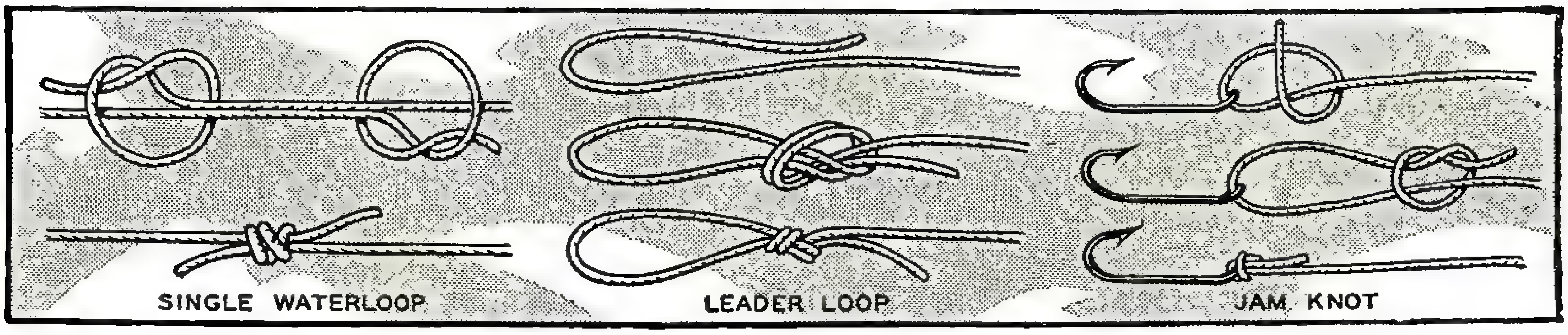
Select your lure to correspond with the type of insect found on the water and the time of day you are fishing. In the evening, when bass feed heavily, pick the night rovers of the air, such as grasshoppers, beetles, moths and dragon flies. Lifelike imitations of all of these can be found in any sporting goods house.

Deep pools close to shore are favorite locations for casting your floating lure in the evening. At that time all manner of life moves to the water's edge, including frogs, mice and crayfish and the bass is there to catch all he can. Cast as close as possible to the shore, sometimes letting the bait land right on the bank. Pull it into the water to give it some semblance of life.

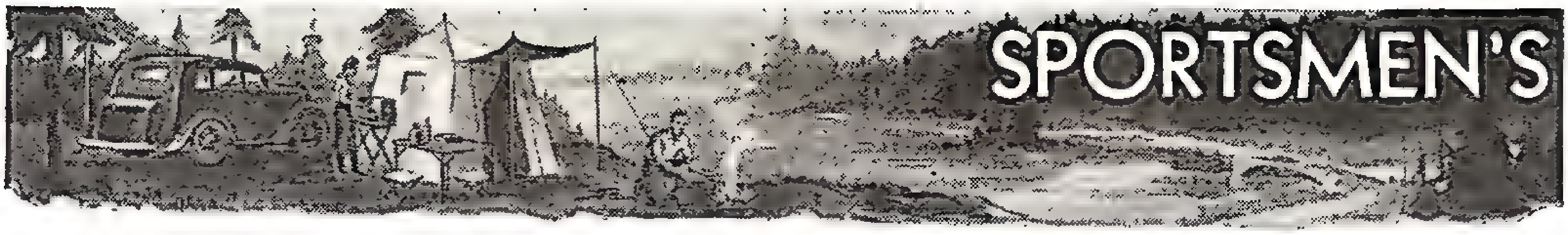
If the bass rises out of the water, creating a disturbance, do not set the hook. It is generally unknown that the bass disturbs water around a bug to wet it down so that it can not rise. Then the fish turns around and seizes its prey. Attempting to set the hook too quickly is a common fault and the reason why so many big ones get away. It is difficult to give proper directions on this point. It is something that comes instinctively after practice.

One of the most tempting lures is the mouse imitation, usually made of bucktail

(Continued on page 130)



Here are three knots that are very useful to fishermen. The jam knot is commonly used for fixing the line to hook or leader loop. The waterloop knot is excellent for typing leader ends. The leader loop shown will not slip.


SPORTSMEN'S

Camper Kinks That Simplify the Tasks of Auto Tourists

THE few short weeks allotted to most of us for a vacation period can be made much more enjoyable, should we choose auto touring, if we carefully plan ahead of time for the needs of the trip.

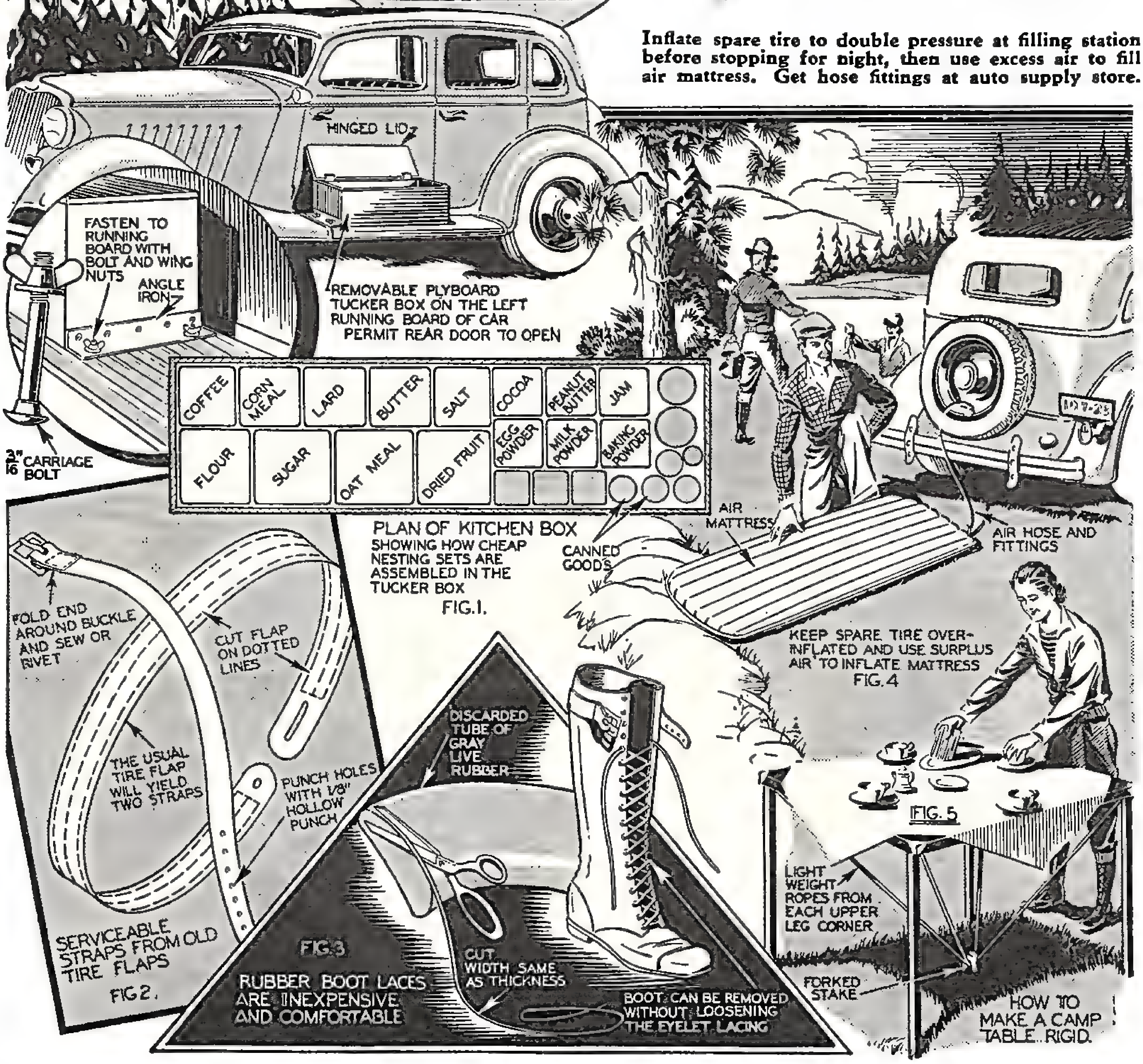
These suggestions for auto tourists, as well as a few "do's" and "don'ts," have all been tried out and approved by experienced campers.

The larder or "tucker box" is perhaps the most important part of the camping equipment. Always carry at least a

(Continued on page 128)

Carry good supply of groceries, so you can stop off at ideal but out-of-the-way camp spots like that shown above.

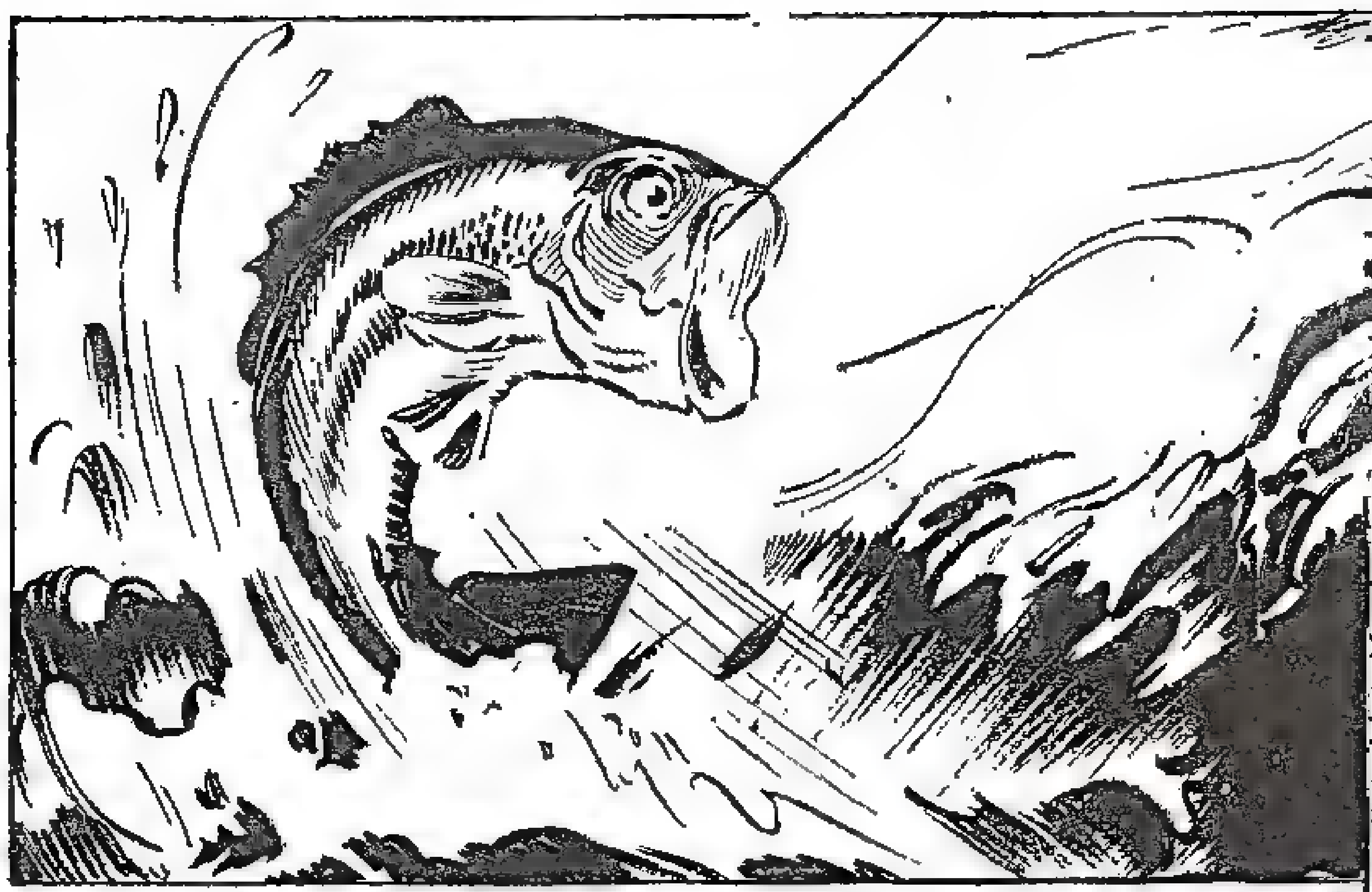
Inflate spare tire to double pressure at filling station before stopping for night, then use excess air to fill air mattress. Get hose fittings at auto supply store.

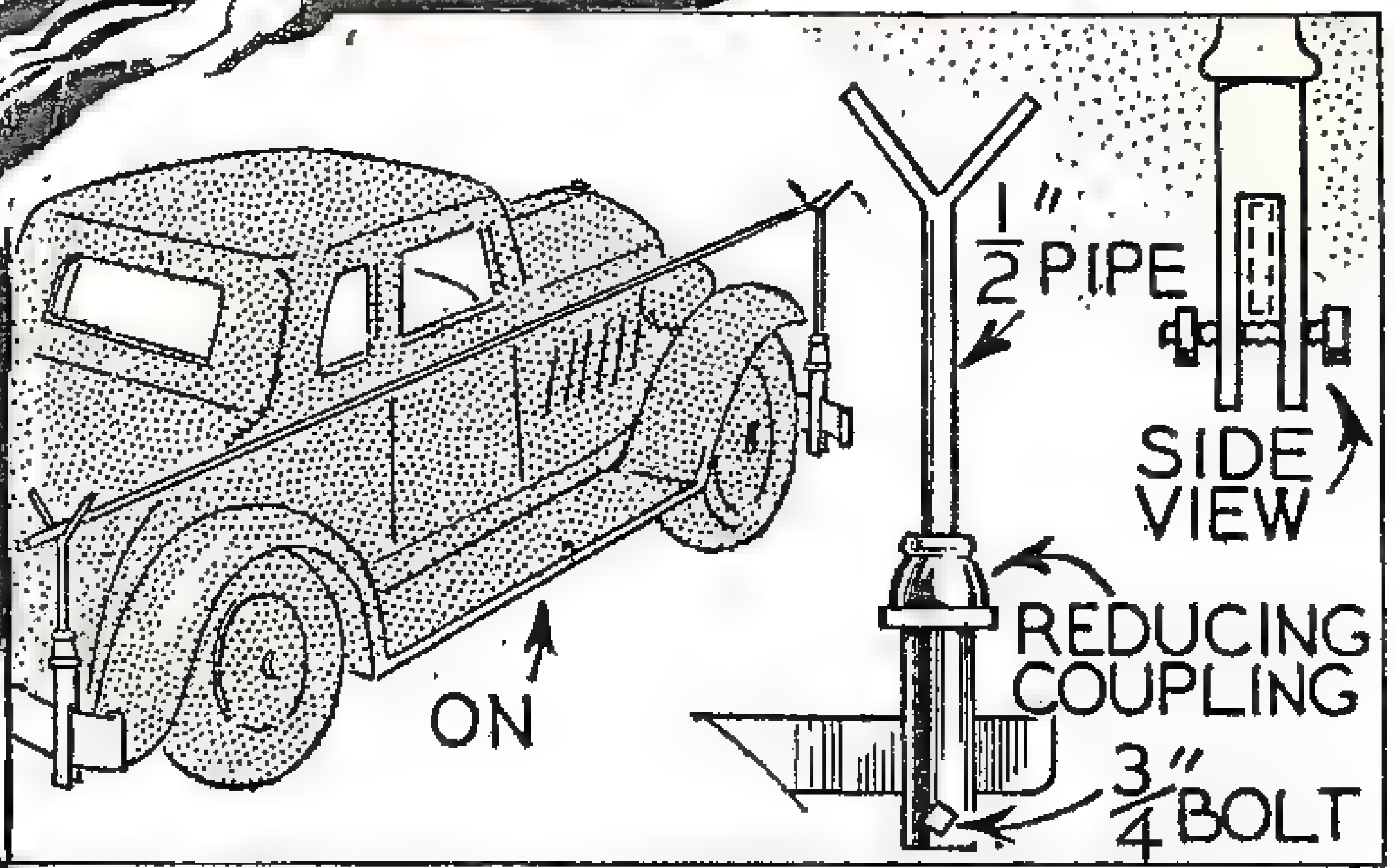

HINGED LID
FASTEN TO RUNNING BOARD WITH BOLT AND WING NUTS
ANGLE IRON
REMOVABLE PLYBOARD TUCKER BOX ON THE LEFT RUNNING BOARD OF CAR PERMIT REAR DOOR TO OPEN
3/16" CARRIAGE BOLT
COFFEE
CORN MEAL
LARD
BUTTER
SALT
COCOA
PEANUT BUTTER
JAM
FLOUR
SUGAR
OAT MEAL
DRIED FRUIT
EGG POWDER
MILK POWDER
BAKING POWDER
CANNED GOODS
PLAN OF KITCHEN BOX SHOWING HOW CHEAP NESTING SETS ARE ASSEMBLED IN THE TUCKER BOX
FIG. 1.
AIR MATTRESS
AIR HOSE AND FITTINGS
KEEP SPARE TIRE OVER-INFLATED AND USE SURPLUS AIR TO INFLATE MATTRESS
FIG. 4
FOLD END AROUND BUCKLE AND SEW OR RIVET
CUT FLAP ON DOTTED LINES
THE USUAL TIRE FLAP WILL YIELD TWO STRAPS
PUNCH HOLES WITH 1/8" HOLLOW PUNCH
SERVICEABLE STRAPS FROM OLD TIRE FLAPS
FIG 2.
DISCARDED TUBE OF GRAY LIVE RUBBER
FIG. 3
RUBBER BOOT LACES ARE INEXPENSIVE AND COMFORTABLE
CUT WIDTH SAME AS THICKNESS
BOOT CAN BE REMOVED WITHOUT LOOSENING THE EYELET LACING
FIG. 5
LIGHT WEIGHT ROPES FROM EACH UPPER LEG CORNER
FORKED STAKE
HOW TO MAKE A CAMP TABLE RIGID

Fishing Handikinks That Will Save Money for the Angler

FISHING rods, be they bamboo or steel, are a vitally important part of any angler's kit. The long bamboo pole without frills will always be a favorite with followers of Izaak Walton, but this fact remains—it is a nuisance to carry around.

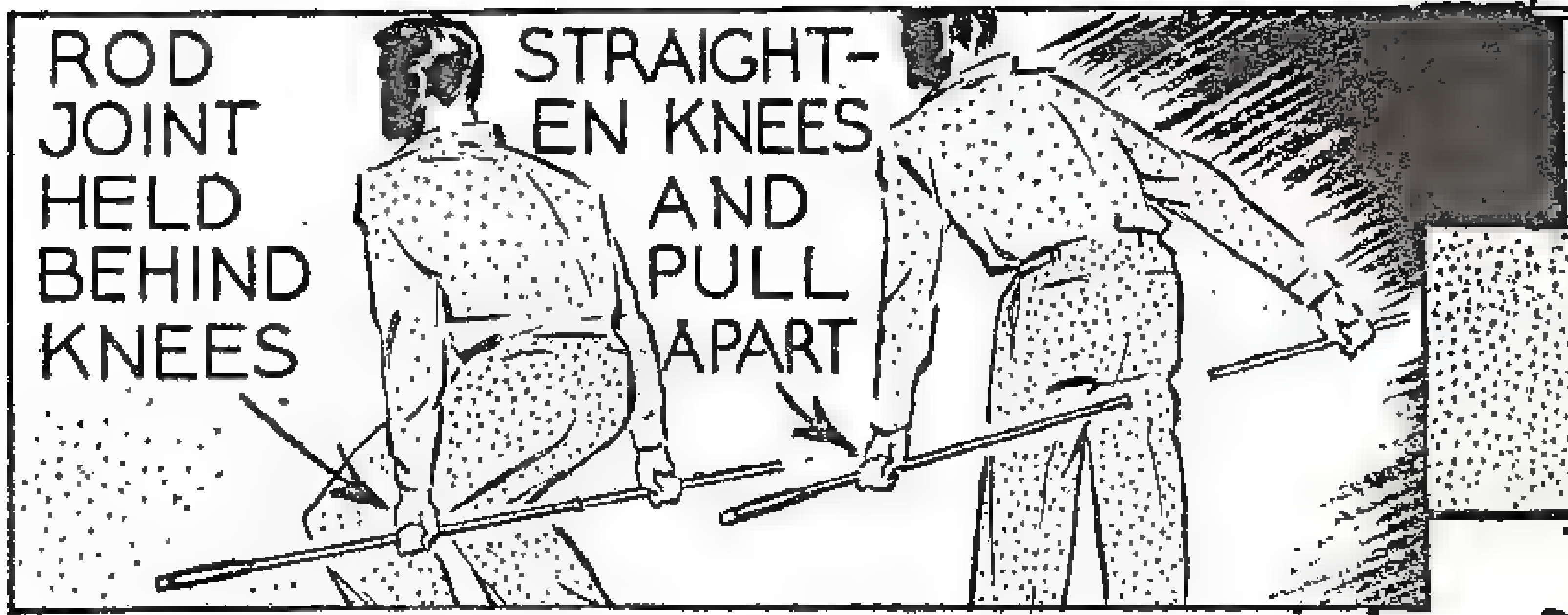
If one has a car, a pole carrier can be fashioned in a few minutes out of scrap pipe fittings. This carrier bolts on to the front and rear bumpers, and so can be removed very easily. The poles are tied in the forked tops of the pipes.



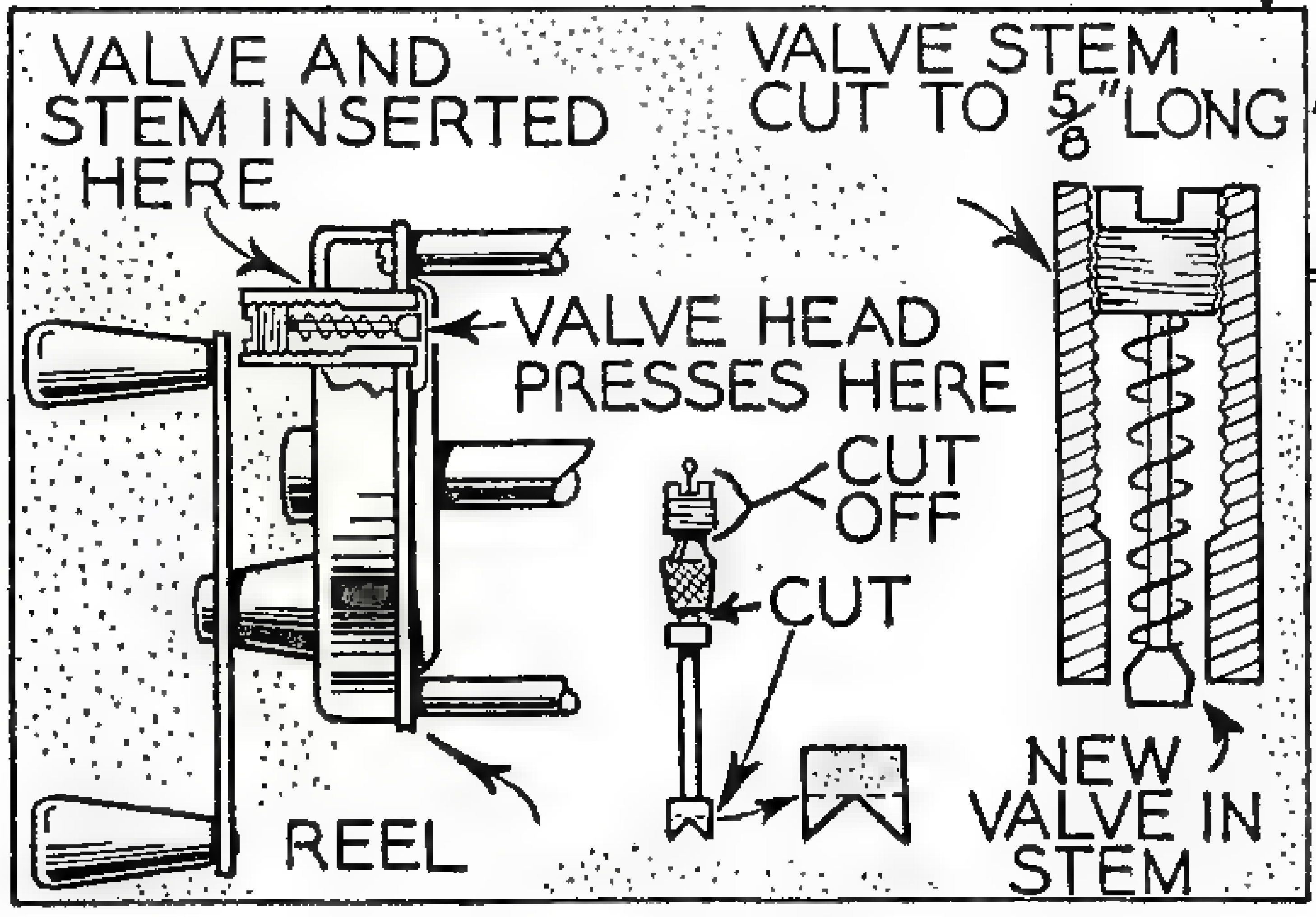

$\frac{1}{2}$" PIPE
SIDE VIEW
REDUCING COUPLING
ON
$\frac{3}{4}$" BOLT

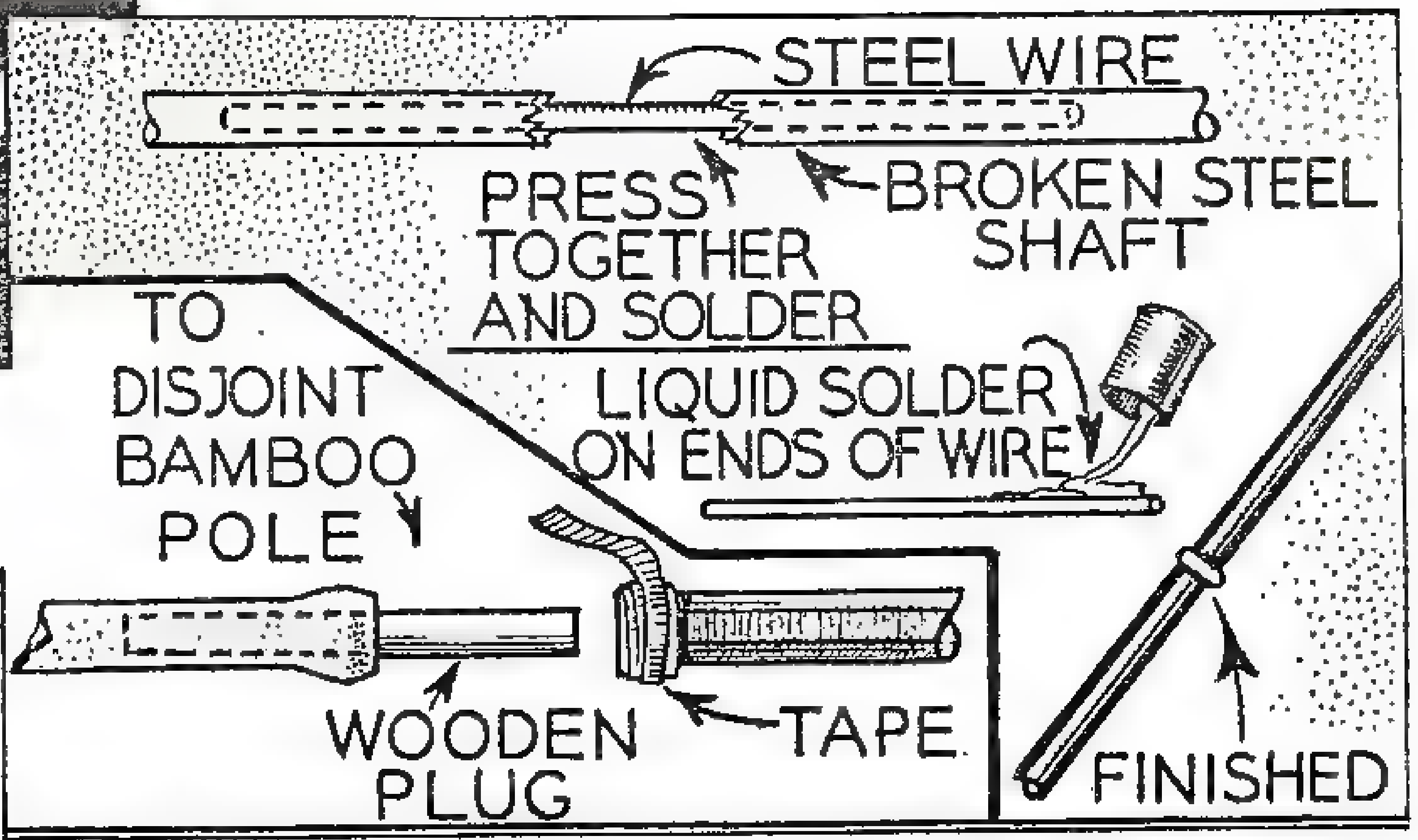
Method for carrying fishpoles. Slot pipe to slip over bumper. Split top end of ½" pipe to form fork.

Below: When rod ferrules stick, warm joint with match, then hold behind knees, straighten knees and spread them apart.


ROD JOINT HELD BEHIND KNEES
STRAIGHTEN KNEES AND PULL APART

To make adjustable anti-backlash drag for reel, solder ⅝" length of valve stem to end plate. Cut off valve as shown below. Turn with valve cap to adjust pressure.


VALVE AND STEM INSERTED HERE
VALVE STEM CUT TO ⅝" LONG
VALVE HEAD PRESSES HERE
CUT OFF
CUT
NEW VALVE IN STEM
REEL

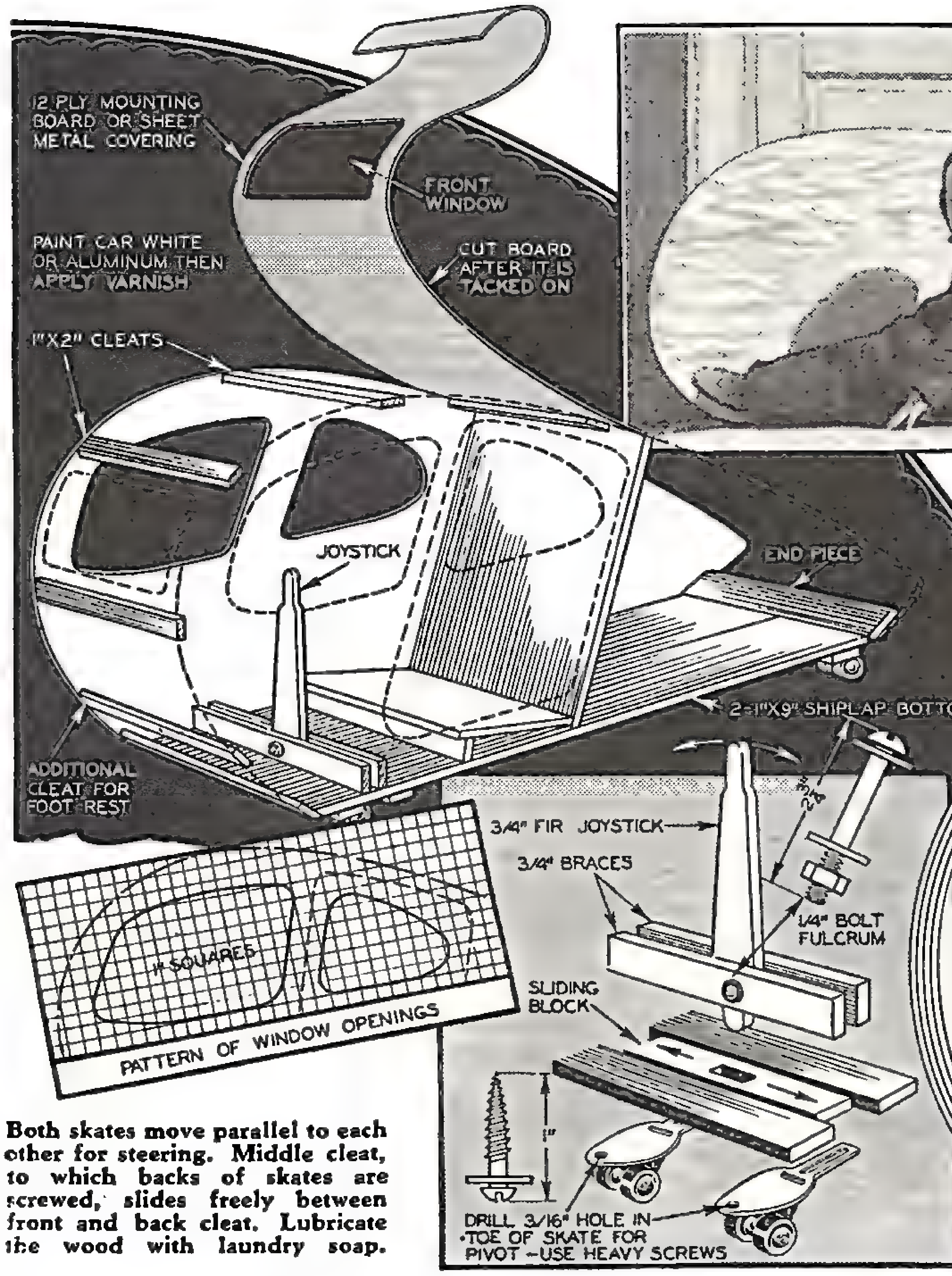

STEEL WIRE
PRESS TOGETHER AND SOLDER
BROKEN STEEL SHAFT
LIQUID SOLDER ON ENDS OF WIRE
TO DISJOINT BAMBOO POLE
WOODEN PLUG
TAPE
FINISHED

To repair broken steel rods, get length of spring steel wire which just fits inside rod. Smear liquid solder on wire, press into broken rod ends, and smooth joint. To make joints in bamboo pole saw into 4-ft. lengths at knuckles, drill holes, and glue in wooden plugs which make snug fit.

Bamboo poles can be readily disjointed and carried inside the car. Drill 4" deep holes, and glue wooden plugs into one end of each section. Reinforce the bamboo ends with tape or stove pipe wire.

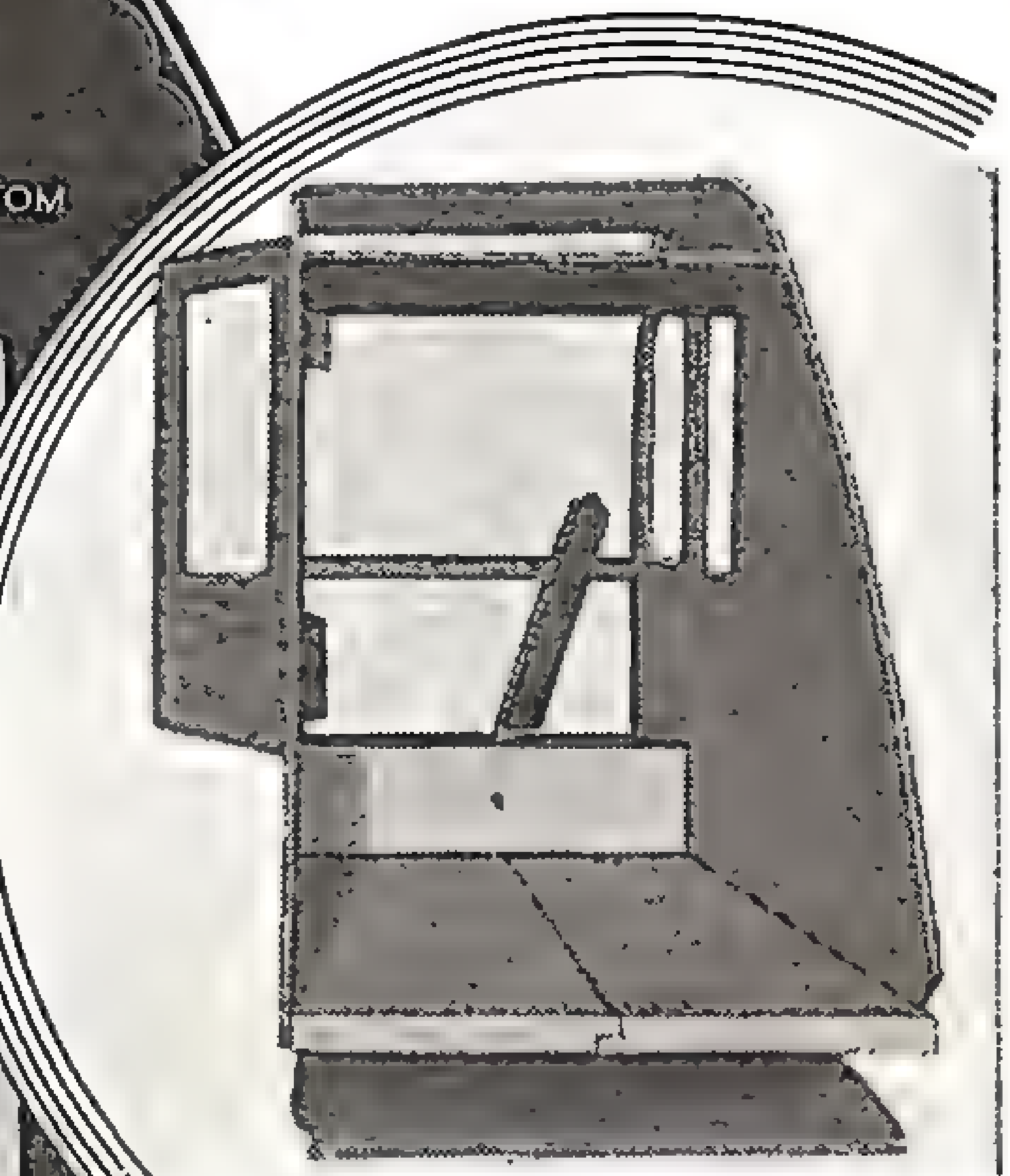
Streamlined SCOOTER Steers

"Tear drop" streamlining with airplane type control gives this cabin scooter an appeal that no boy can resist. Young and old alike will stop to watch when this streamlined pushmobile job is brought out on the sidewalk for its first test run.

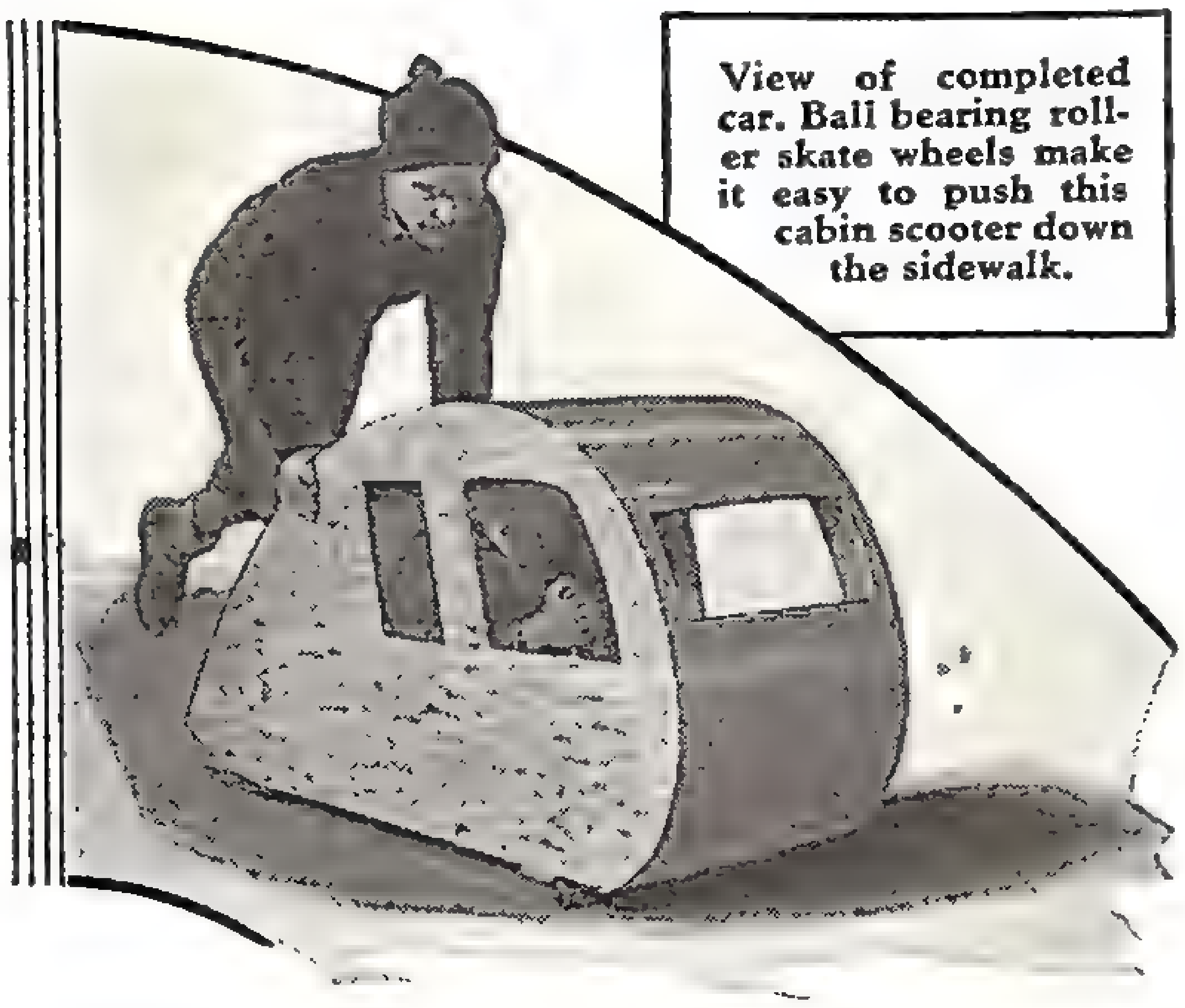

12 PLY MOUNTING BOARD OR SHEET METAL COVERING
FRONT WINDOW
PAINT CAR WHITE OR ALUMINUM THEN APPLY VARNISH
CUT BOARD AFTER IT IS TACKED ON
1"X2" CLEATS
JOYSTICK
END PIECE
2-1"X9" SHIPLAP BOTTOM
ADDITIONAL CLEAT FOR FOOT REST
1" SQUARES
PATTERN OF WINDOW OPENINGS
3/4" FIR JOYSTICK
3/4" BRACES
1/4" BOLT FULCRUM
SLIDING BLOCK
1"
DRILL 3/16" HOLE IN TOE OF SKATE FOR PIVOT -USE HEAVY SCREWS

Both skates move parallel to each other for steering. Middle cleat, to which backs of skates are screwed, slides freely between front and back cleat. Lubricate the wood with laundry soap.

Have youngster for whom scooter is built sit up against the plywood panel. Draw an outline for the streamlining which will allow him full head room when sitting.



Back view showing platform just back of seat.



View of completed car. Ball bearing roller skate wheels make it easy to push this cabin scooter down the sidewalk.

SO GREAT is the appeal of this new variation of the old time roller skate coaster that youngsters will swarm out from everywhere to watch it, to push it, to ride in it.

Perhaps it is the snugness of the little cabin that appeals; perhaps it is the airplane type control which is the *piece de resistance* for everyone who has ever hankered to be a pilot; or perhaps it is that we are "tear-drop" conscious, because of auto manufacturer advertising. Anyway young and old alike stopped to watch when this streamlined cabin scooter was "put out on the road" for the first tests.

The cost of the scooter is negligible. Enough roller skates for the entire job can be purchased at a dime store for 40 cents. Any lumber yard will supply ¼" fir ply-

with AIRPLANE JOYSTICK

by WESTON FARMER

wood for the sides, and the rest of the lumber is generally in the scrap heap.

Cut out the two side panels first, tacking them together lightly so they can both be sawed at the same time. Lay out streamlined design so there is no wasted space, but still sufficient head room and leg room for the biggest lad that will use the scooter.

After sawing out the two panels and cutting out door and windows as indicated on the plans, make the bottom of the coaster.

Match together enough boards for a platform 18" wide and 30" long—if you use shiplap and trim off the outer laps but two boards will be needed. Screw 1"x4" cleats across the bottom, using two at the front for the steering arrangement. When mounting the rear skates on the cleat, bend the heel portion of the skates in a vise to fit snugly around the cleat. Fasten the skates in place with screws.

The only complicated part of the entire construction is the airplane type steering control—and it isn't at all hard to make. Drill $\frac{3}{16}$" holes in the toes of the two front skates, to serve as pivot holes.

Cut out a hole in the sliding cleat for the end of the steering lever. Put heavy screws through the adjusting slots of the skates into the middle cleat, lining up the skates first. Mount the joystick between two braces, using a quarter inch bolt for a pivot, and the steering joystick is completed.

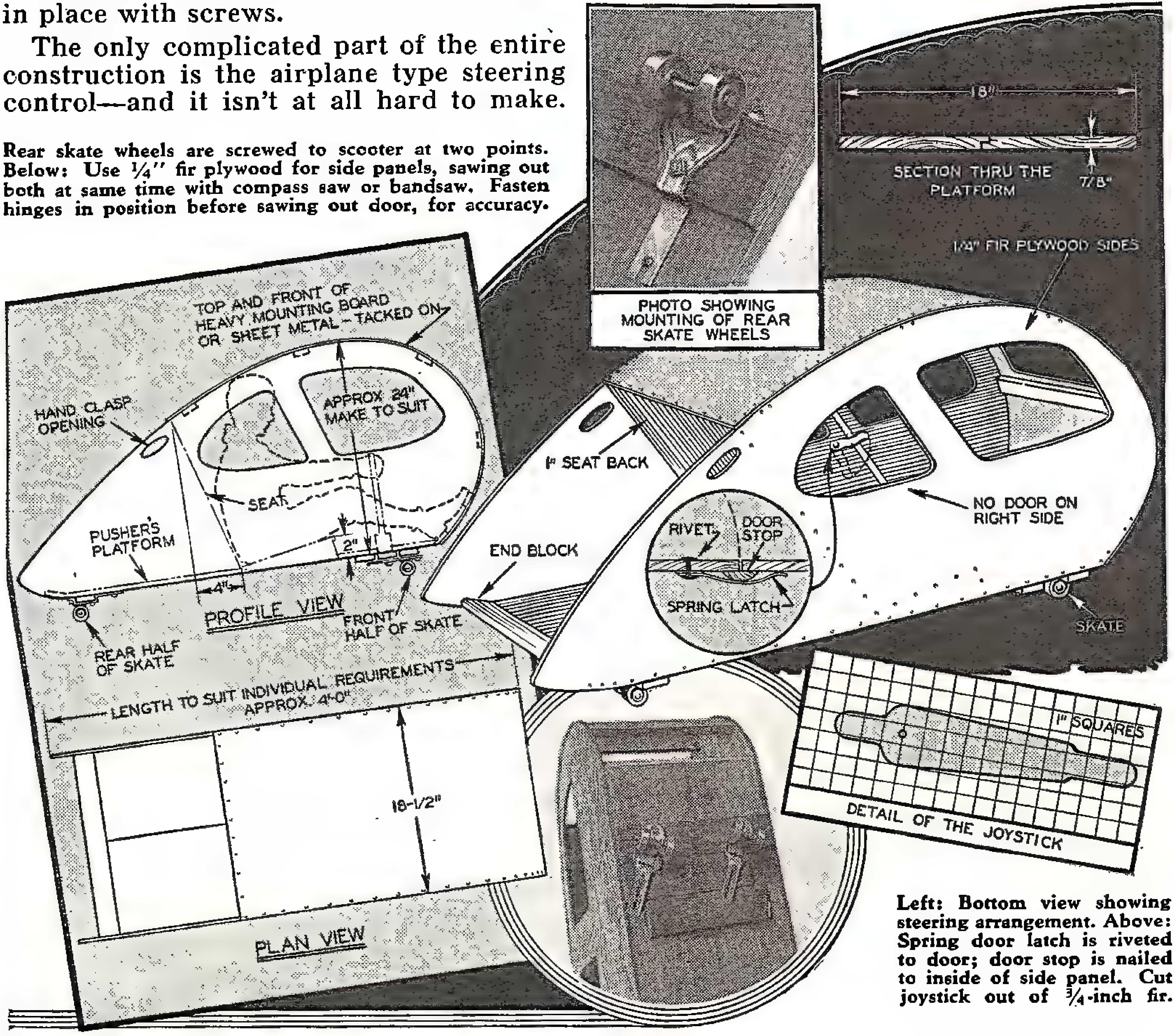
Next set in the seat, slanting it at a comfortable angle. Nail on the sides with 7 penny box nails, being sure they are parallel. Use 1"x2" spacers along the top.

The covering can be of heavy cardboard or tin 24"x36" in size. Use ½" large head brads or tacks, not the pointed carpet tacks.

The car is then ready for painting. White makes the best color, but any other color scheme may be used to suit the fancy.

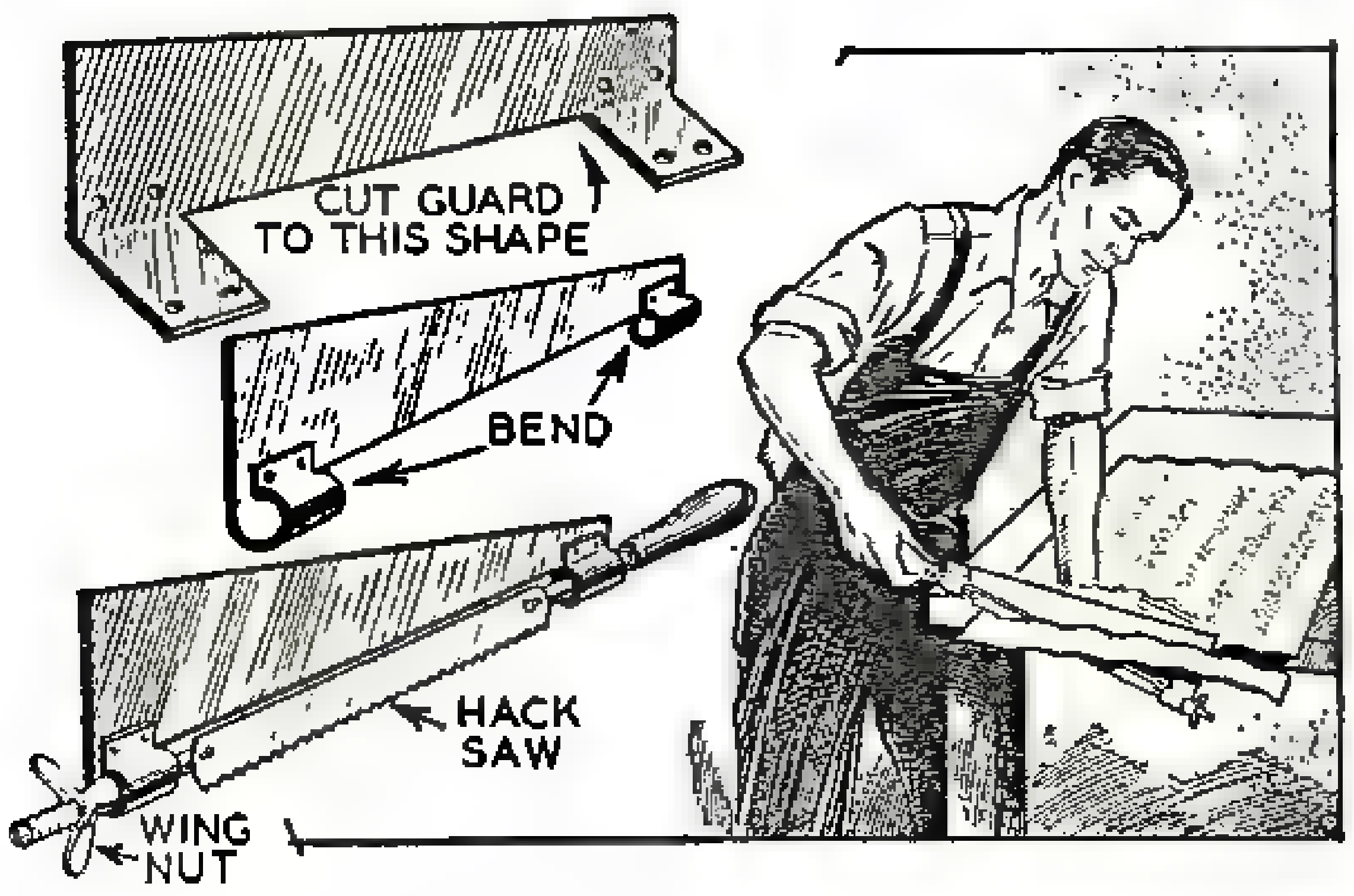
With friends taking turns pushing and riding, the lad for whom this coaster is built will be the envy of the neighborhood.

Rear skate wheels are screwed to scooter at two points. Below: Use ¼" fir plywood for side panels, sawing out both at same time with compass saw or bandsaw. Fasten hinges in position before sawing out door, for accuracy.


TOP AND FRONT OF HEAVY MOUNTING BOARD OR SHEET METAL - TACKED ON
HAND CLASP OPENING
APPROX 24" MAKE TO SUIT
SEAT
PUSHER'S PLATFORM
2"
4"
PROFILE VIEW
FRONT HALF OF SKATE
REAR HALF OF SKATE
LENGTH TO SUIT INDIVIDUAL REQUIREMENTS APPROX. 4'-0"
18-1/2"
PLAN VIEW
PHOTO SHOWING MOUNTING OF REAR SKATE WHEELS
18"
SECTION THRU THE PLATFORM
7/8"
1/4" FIR PLYWOOD SIDES
1" SEAT BACK
END BLOCK
RIVET
DOOR STOP
SPRING LATCH
NO DOOR ON RIGHT SIDE
SKATE
1" SQUARES
DETAIL OF THE JOYSTICK

Left: Bottom view showing steering arrangement. Above: Spring door latch is riveted to door; door stop is nailed to inside of side panel. Cut joystick out of ¾-inch fir.

TIPS FOR THE WORKSHOP FAN

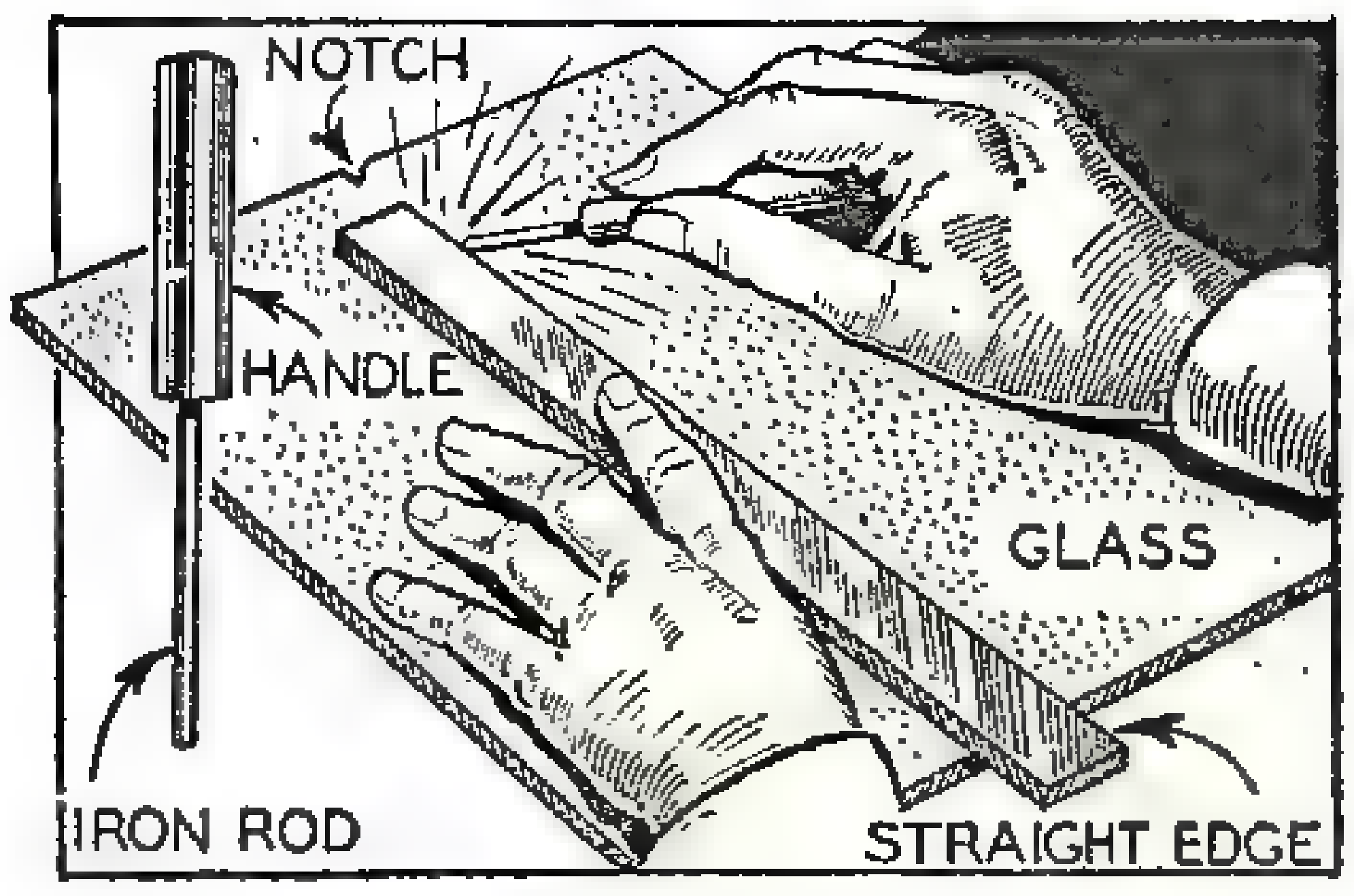

CUT GUARD TO THIS SHAPE
BEND
HACK SAW
WING NUT

Making a Hacksaw That Cuts Sheet Metal

IT IS very difficult to cut sheet metal with an ordinary hacksaw. Take an old hand saw blade and cut out to the shape shown. Leave lugs on each end which can be rolled into loops and riveted. Ordinary hacksaw fittings can then be used, including the handle. This saw will cut even the heavier grades of corrugated iron without pinching.—A. H. Waychoff.

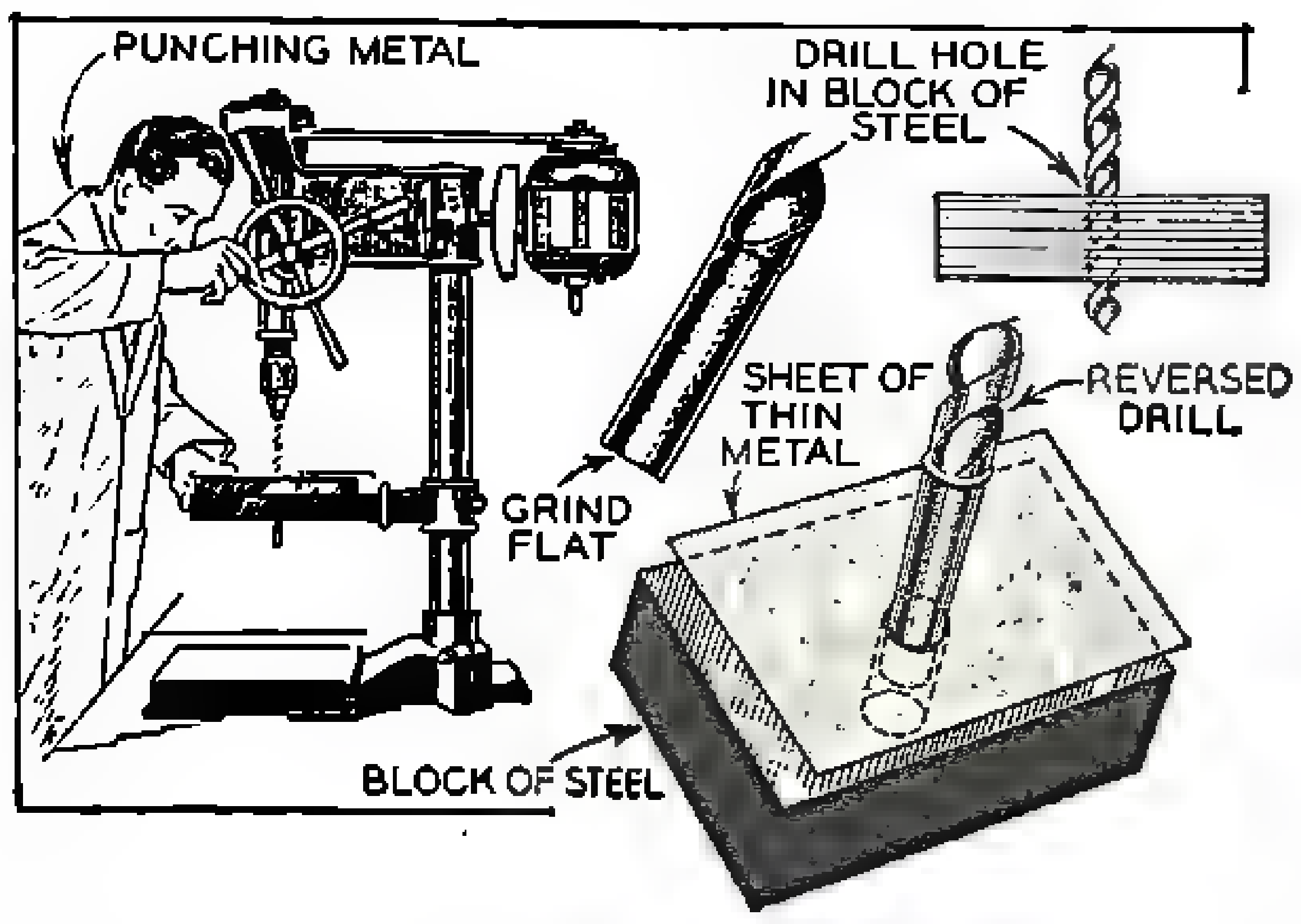
Cutting Glass

OFTEN when a piece of glass must be cut, no glass cutter is available. File a small notch in the edge of the pane to be cut. With a red-hot iron rod about 1/16″ in diameter trace the line or design you wish cut, using a ruler as guide if necessary. A crack will start at the notch and follow the hot iron.—H. Arrall.


NOTCH
HANDLE
GLASS
IRON ROD
STRAIGHT EDGE

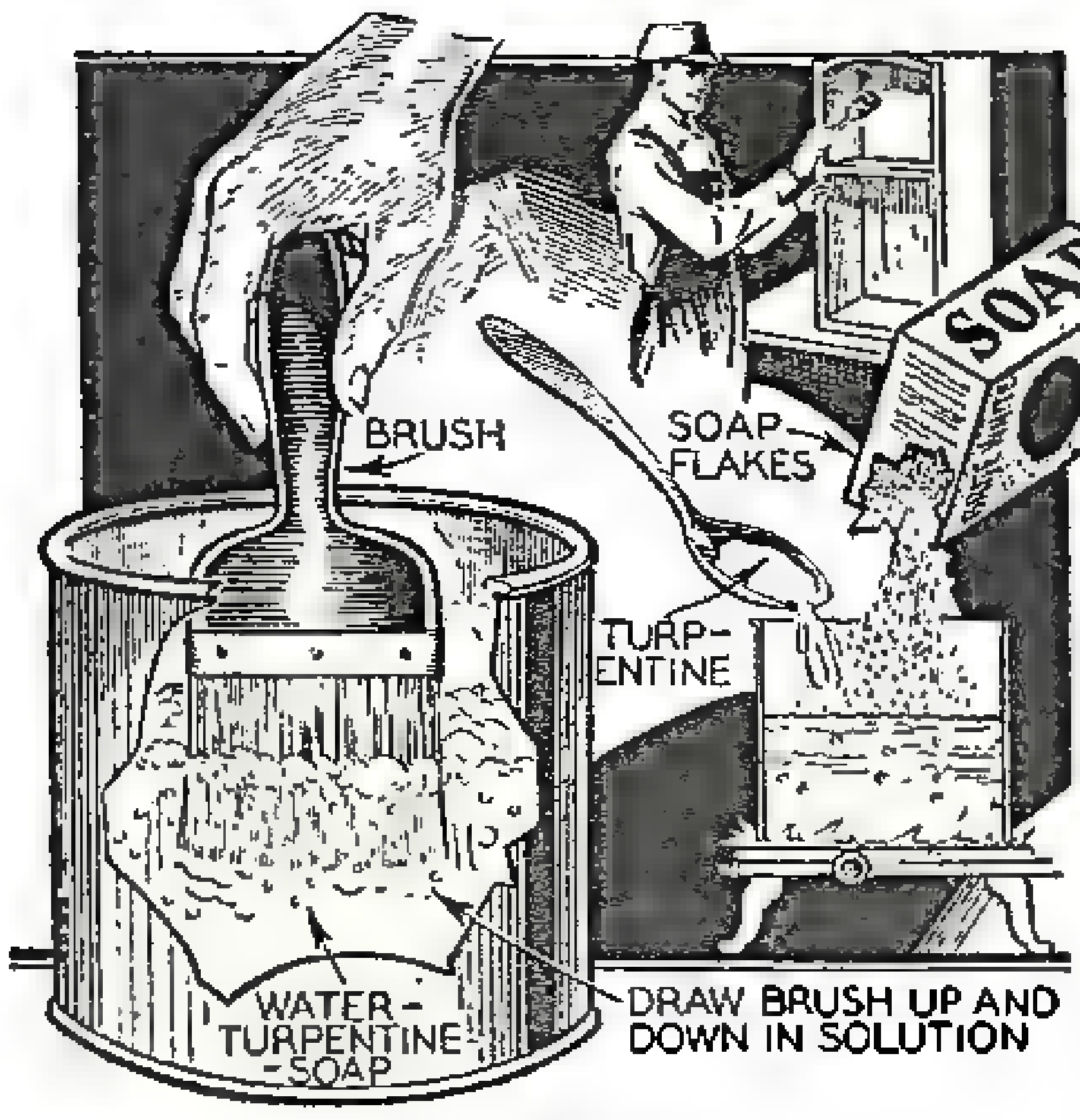
Punching Small Holes on a Drill Press

A DRILL press may be used to pierce small holes in thin sheet metal or in material which is hard to drill. First drill the required size hole in a block of steel. Remove the drill and grind the plain end flat. Replace the drill with the flat end down, line up the drill with the hole in the steel, and you have a punch and die which will pierce out a neat hole in a jiffy.—J. C. Kauffman.

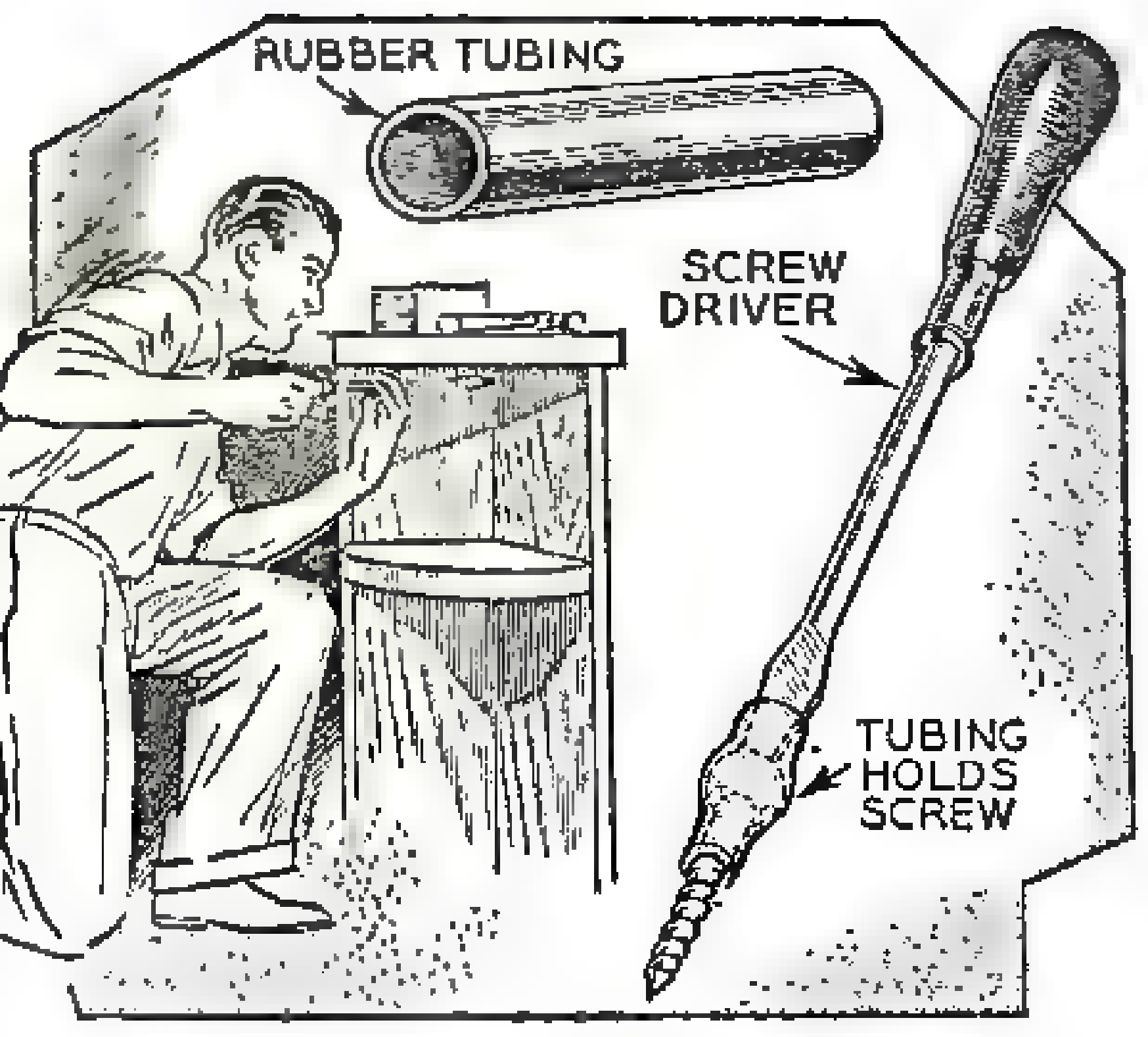

PUNCHING METAL
DRILL HOLE IN BLOCK OF STEEL
SHEET OF THIN METAL
REVERSED DRILL
GRIND FLAT
BLOCK OF STEEL

Clean Paint Brushes With Soap and Turpentine

IF YOU have an old paint brush with hairs brittle and hard, this remedy will never fail to make it soft again. Fill a can with enough water to cover the bristles. Dump about a tea cup of any soapy, strong washing powder into the water, and add about a tablespoonful of turpentine; heat until the mixture boils. Work the brush up and down against the bottom of the can continually, spreading the hairs as much as possible, until all the old paint is loose. Wash in cold water to remove all the soap.—H. L. Zimmer.


SOAP
BRUSH
SOAP-FLAKES
TURP-ENTINE
WATER-TURPENTINE-SOAP
DRAW BRUSH UP AND DOWN IN SOLUTION

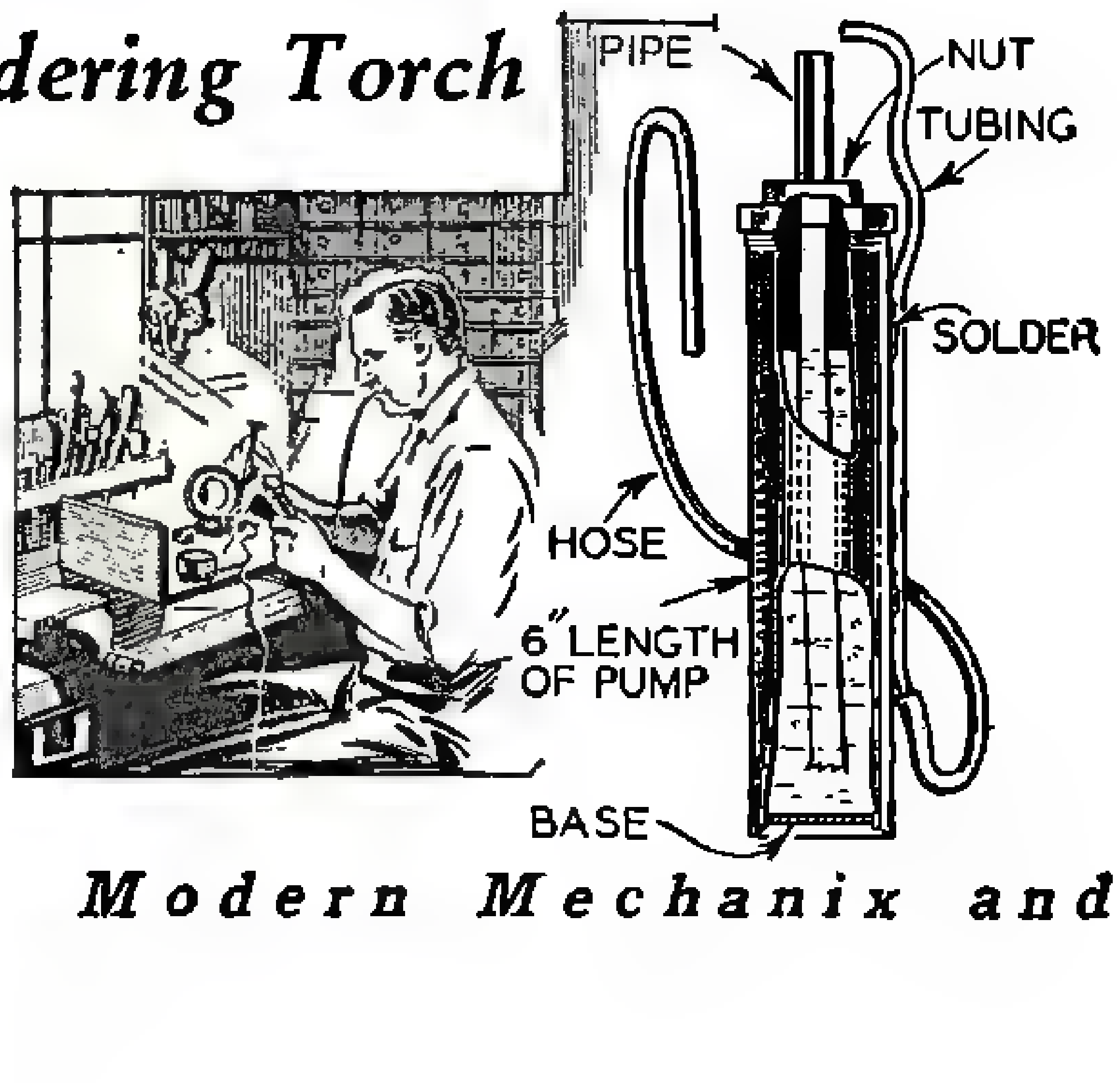
Tubing Holds Screws


RUBBER TUBING
SCREW DRIVER
TUBING HOLDS SCREW

FOR starting screws in hard places, nothing can beat this little idea. Slip a short length of rubber tubing over the bit of the screwdriver and over the head of the screw. Use a piece of tubing small enough so that it has to be stretched a little over both screwdriver and screw head. This holds the screw securely so that it can be started in the most awkward position imaginable.—W. H. Anderson.

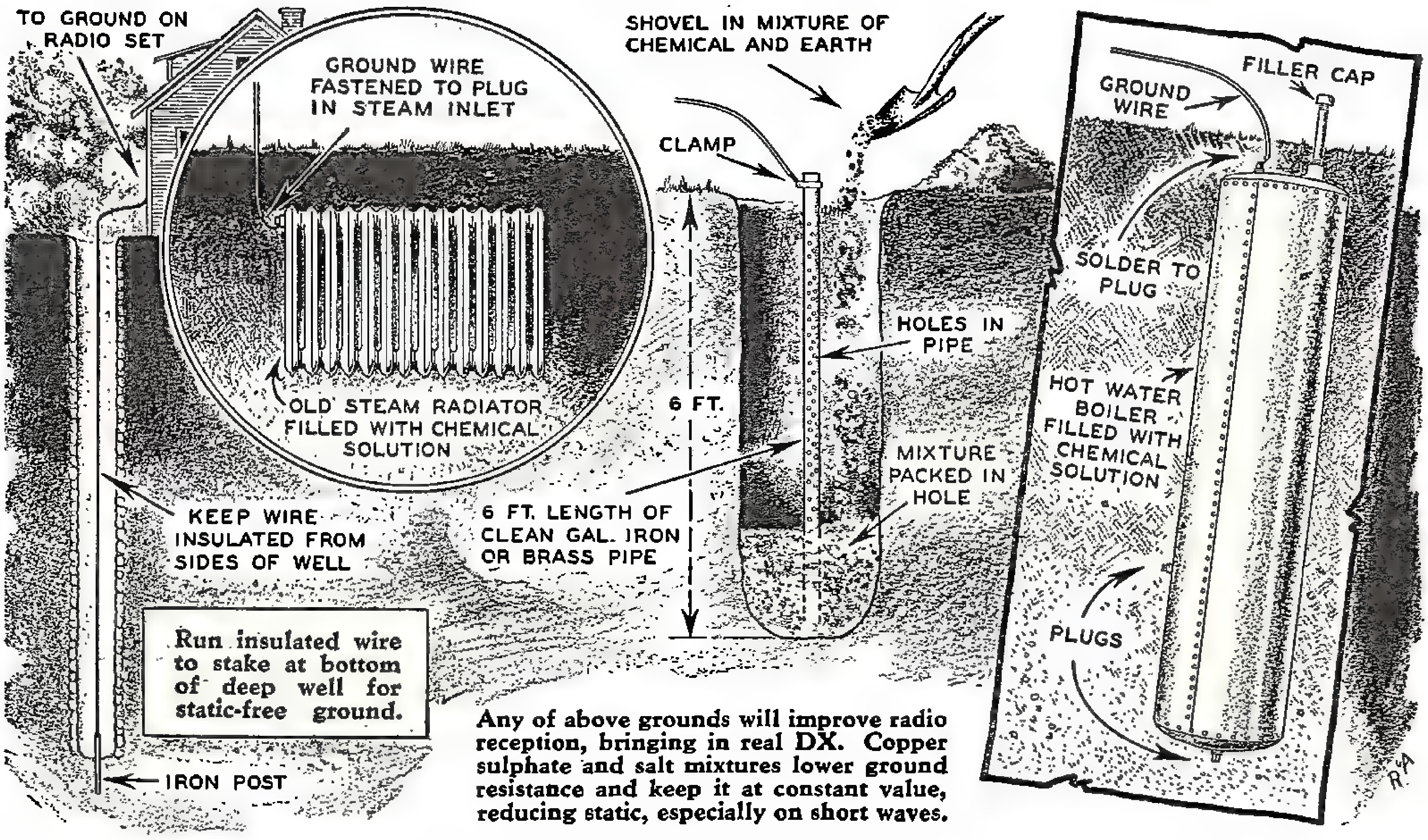
Make Gasoline Soldering Torch

THIS handy torch uses gasoline for fuel, giving a steady jet of blue flame which is ideal for light soldering. Get an old tire pump and saw it off about 6″ from the threaded end. Drill a ⅜″ hole in the cap and solder in a short pipe for the wick. Solder a disc of sheet metal to the bottom and a length of small copper tubing to the barrel. Roll a piece of cloth into a wick and push it through the top pipe. Fill the torch with gasoline, light the wick, and blow steadily through the copper tubing.—Bob Youngquist.


PIPE
NUT
TUBING
SOLDER
HOSE
6″ LENGTH OF PUMP
BASE

RADIO SPARKS

Good Grounds Improve DX Reception of Any Receiver


TO GROUND ON RADIO SET
GROUND WIRE FASTENED TO PLUG IN STEAM INLET
OLD STEAM RADIATOR FILLED WITH CHEMICAL SOLUTION
KEEP WIRE INSULATED FROM SIDES OF WELL
IRON POST
SHOVEL IN MIXTURE OF CHEMICAL AND EARTH
CLAMP
HOLES IN PIPE
6 FT.
6 FT. LENGTH OF CLEAN GAL. IRON OR BRASS PIPE
MIXTURE PACKED IN HOLE
GROUND WIRE
FILLER CAP
SOLDER TO PLUG
HOT WATER BOILER FILLED WITH CHEMICAL SOLUTION
PLUGS

Run insulated wire to stake at bottom of deep well for static-free ground.

Any of above grounds will improve radio reception, bringing in real DX. Copper sulphate and salt mixtures lower ground resistance and keep it at constant value, reducing static, especially on short waves.

MORE and more, radio engineers are recognizing the fact that a *good* ground is absolutely essential, especially for real DX on the short waves.

Experiments have proved that a radio ground established far down into the earth, with heavily insulated lead-down wires, keeps radio static down to a minimum even during thunder storms. Be sure the wire does not touch the walls of the well.

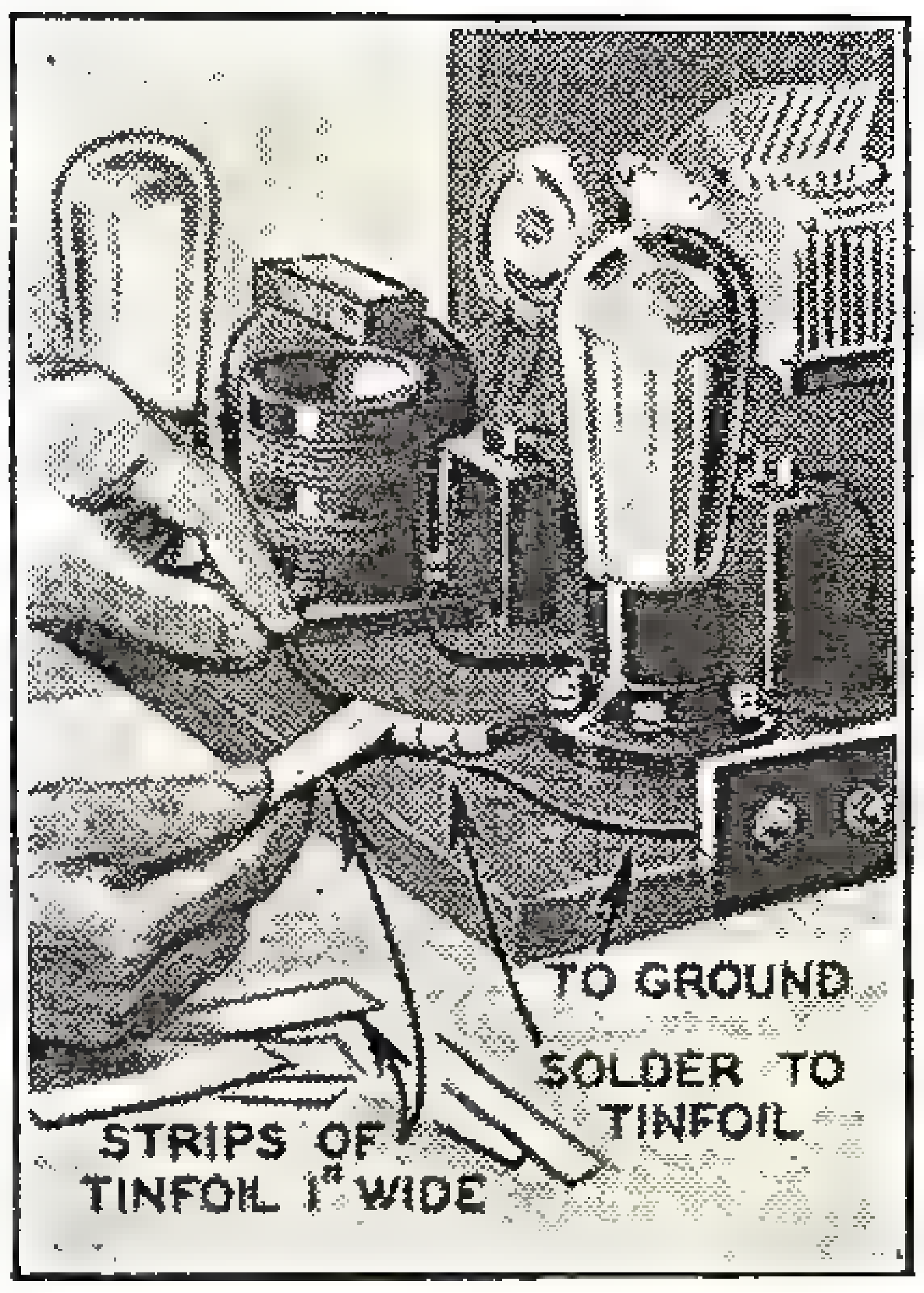
An electro-chemical ground is easy to make. Dig a 6-ft. hole in damp ground, and place in it a length of copper or galvanized pipe having a number of ¼" holes in it. Mix up 3 lbs. copper sulphate, 5 lbs. rock salt, and 3 lbs. pulverized charcoal with the earth removed, then tamp down in the hole. Fill the pipe with water every week.

Clean all paint off an old steam radiator or water tank, plug up all openings, and bury in damp ground. Fill with water containing the previously mentioned chemicals, leaving out the charcoal. Replace the evaporated water occasionally.

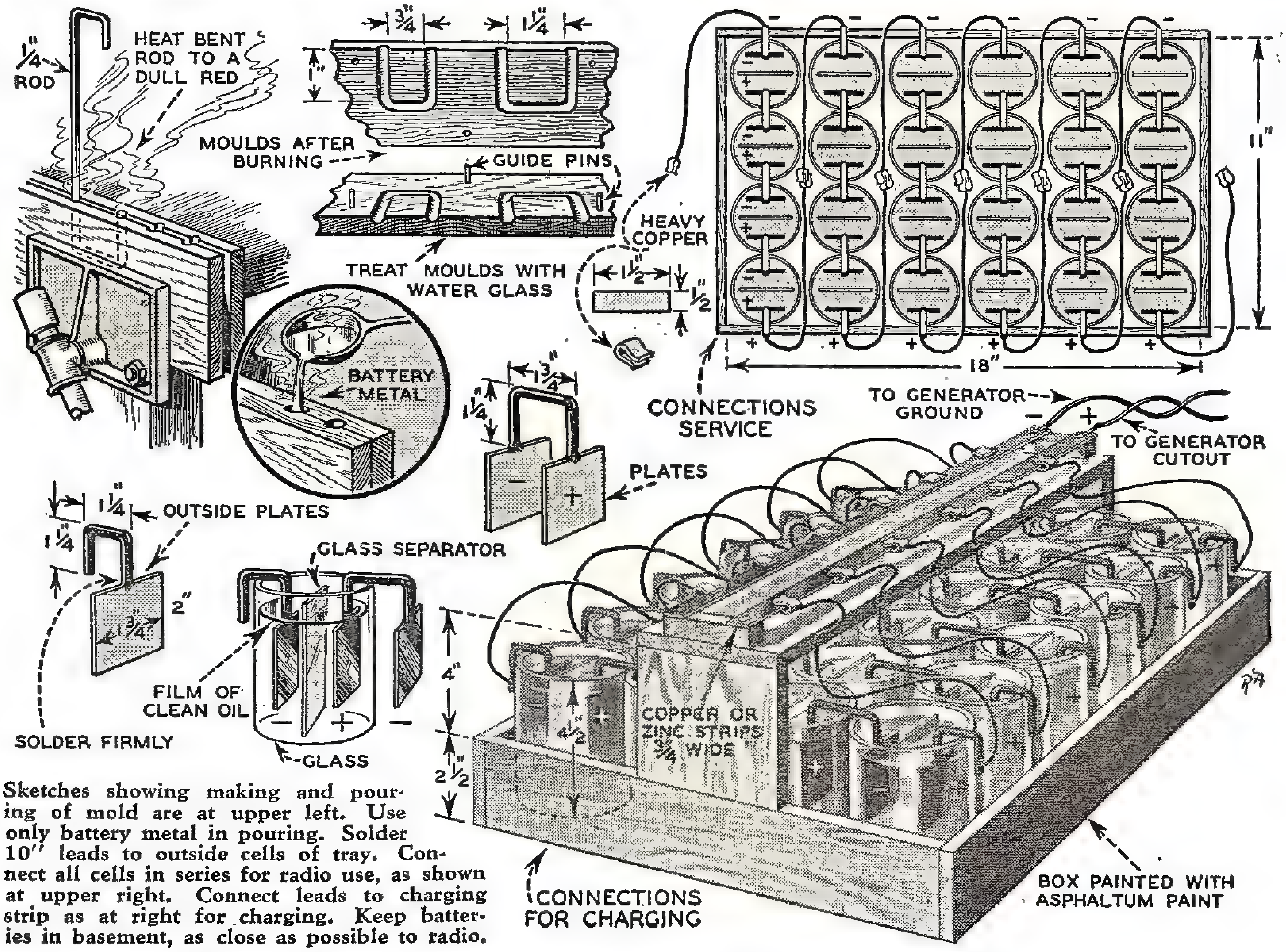
Stopping A.C. Hum With Tinfoil

MANY radio experimenters using the new a.c. tubes in regenerative short wave circuits are finding hum very annoying. It can be reduced considerably, however, by winding strips of tinfoil around all leads carrying alternating current. The foil can be grounded with a flexible wire and a drop of solder.

Use insulating tape under the foil where there is danger of a short-circuit, and especially near binding posts. Results will be gratifying. This kink works very well on short wave sets that show a body capacity effect.


TO GROUND
SOLDER TO TINFOIL
STRIPS OF TINFOIL 1" WIDE

Make Wet B Batteries for Radio From a Storage Battery



1/4" ROD
HEAT BENT ROD TO A DULL RED
3/4"
1 1/4"
1"
MOULDS AFTER BURNING
GUIDE PINS
TREAT MOULDS WITH WATER GLASS
HEAVY COPPER
1 1/2"
1/2"
BATTERY METAL
11"
18"
CONNECTIONS SERVICE
TO GENERATOR GROUND
TO GENERATOR CUTOUT
1 3/4"
1 1/4"
PLATES
1 1/4
OUTSIDE PLATES
2"
1 3/4"
GLASS SEPARATOR
FILM OF CLEAN OIL
SOLDER FIRMLY
GLASS
4"
2 1/2
4 1/2
COPPER OR ZINC STRIPS 3/4 WIDE
CONNECTIONS FOR CHARGING
BOX PAINTED WITH ASPHALTUM PAINT

Sketches showing making and pouring of mold are at upper left. Use only battery metal in pouring. Solder 10″ leads to outside cells of tray. Connect all cells in series for radio use, as shown at upper right. Connect leads to charging strip as at right for charging. Keep batteries in basement, as close as possible to radio.

THIS wet type B battery entirely eliminates the B battery nuisance of old radio sets.

Saw off the plates of an old car battery—use good plates even if you have to buy a cheap, new 6-volt battery.

Allow the plates to dry thoroughly, then cut a section 1¾″x2″ from each corner.

Burn out the mold for the plate couplings, after setting in the aligning dowels. Place the mold in a vise and pour in melted battery metal. Use acid core solder in soldering the couplings to the plates.

Pint beverage bottles cut off 4½″ from the bottom are ideal for jars. Build a wooden tray for the jars. 24 units should test 60 volts when charged, each jar being 2½ volts normally.

Clean the glasses and plates in rainwater. Arrange the plates according to the diagram to secure the correct polarity. Separate the plates with glass panes.

Get sulphuric acid at your garage, and dilute with rainwater until it tests 1250 with a hydrometer. Don't pour water into the acid—it will explode.

Fill each cell until the plates are covered, then pour a thin film of clean oil on top.

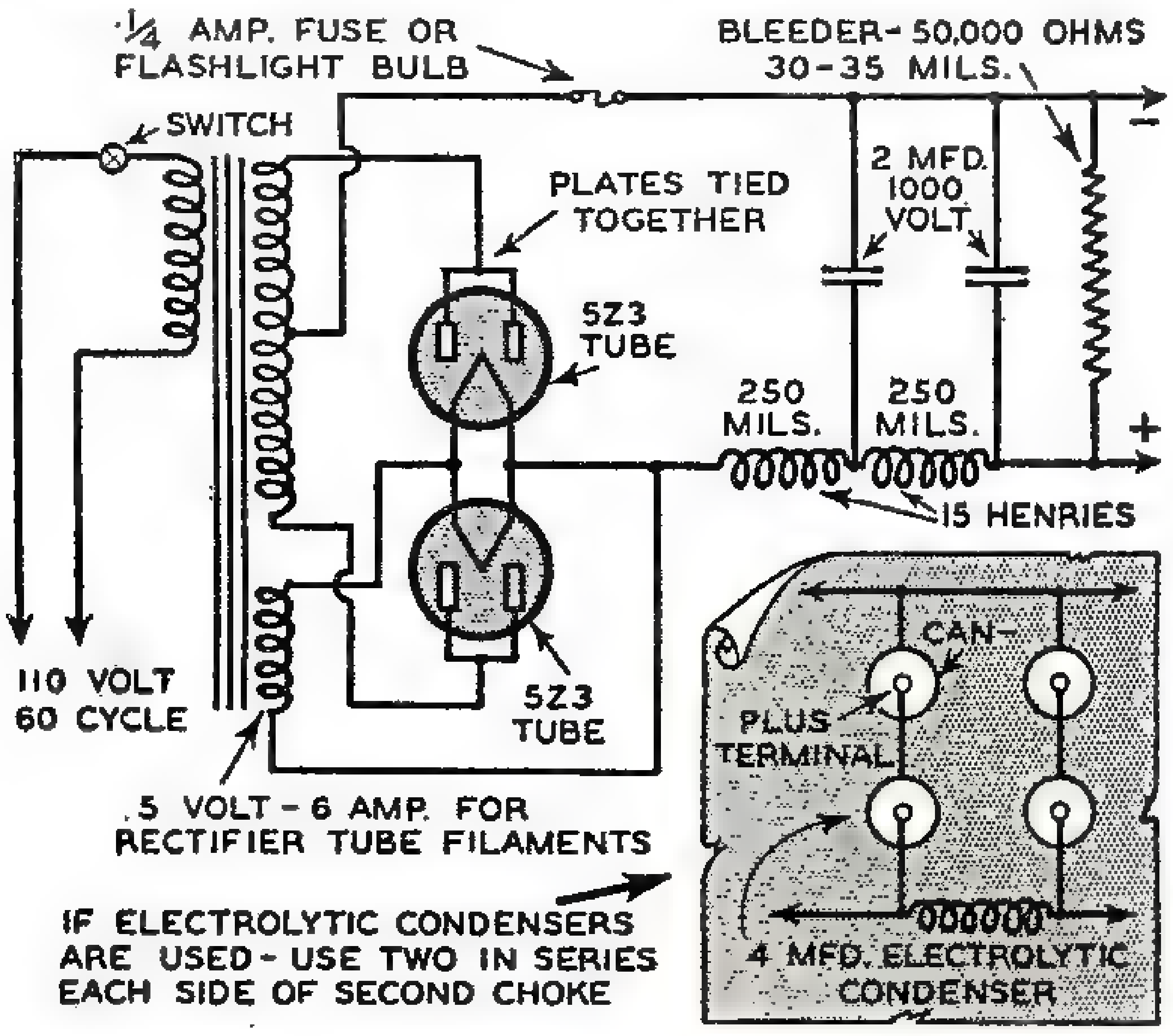
For charging, the batteries are connected in parallel banks of four cells each, and connected to an auto generator.

Build a Heavy Duty Power Supply

THIS power pack will deliver approximately 500 volts at 200 milliamperes, enough to operate a small transmitter.

Use a power transformer rated at 600 volts each side of the center tap. Because of their cheapness, two 5Z3 tubes are used as half wave rectifiers. As such they will easily stand 1000 volts.

The filter condensers will have to stand up on 1000 volts. If electrolytics are used, connect two in series as shown.



1/4 AMP. FUSE OR FLASHLIGHT BULB
BLEEDER- 50,000 OHMS 30-35 MILS.
SWITCH
PLATES TIED TOGETHER
2 MFD. 1000 VOLT
−
5Z3 TUBE
250 MILS.
250 MILS.
+
15 HENRIES
110 VOLT 60 CYCLE
5Z3 TUBE
CAN
PLUS TERMINAL
.5 VOLT - 6 AMP. FOR RECTIFIER TUBE FILAMENTS
IF ELECTROLYTIC CONDENSERS ARE USED - USE TWO IN SERIES EACH SIDE OF SECOND CHOKE
4 MFD. ELECTROLYTIC CONDENSER

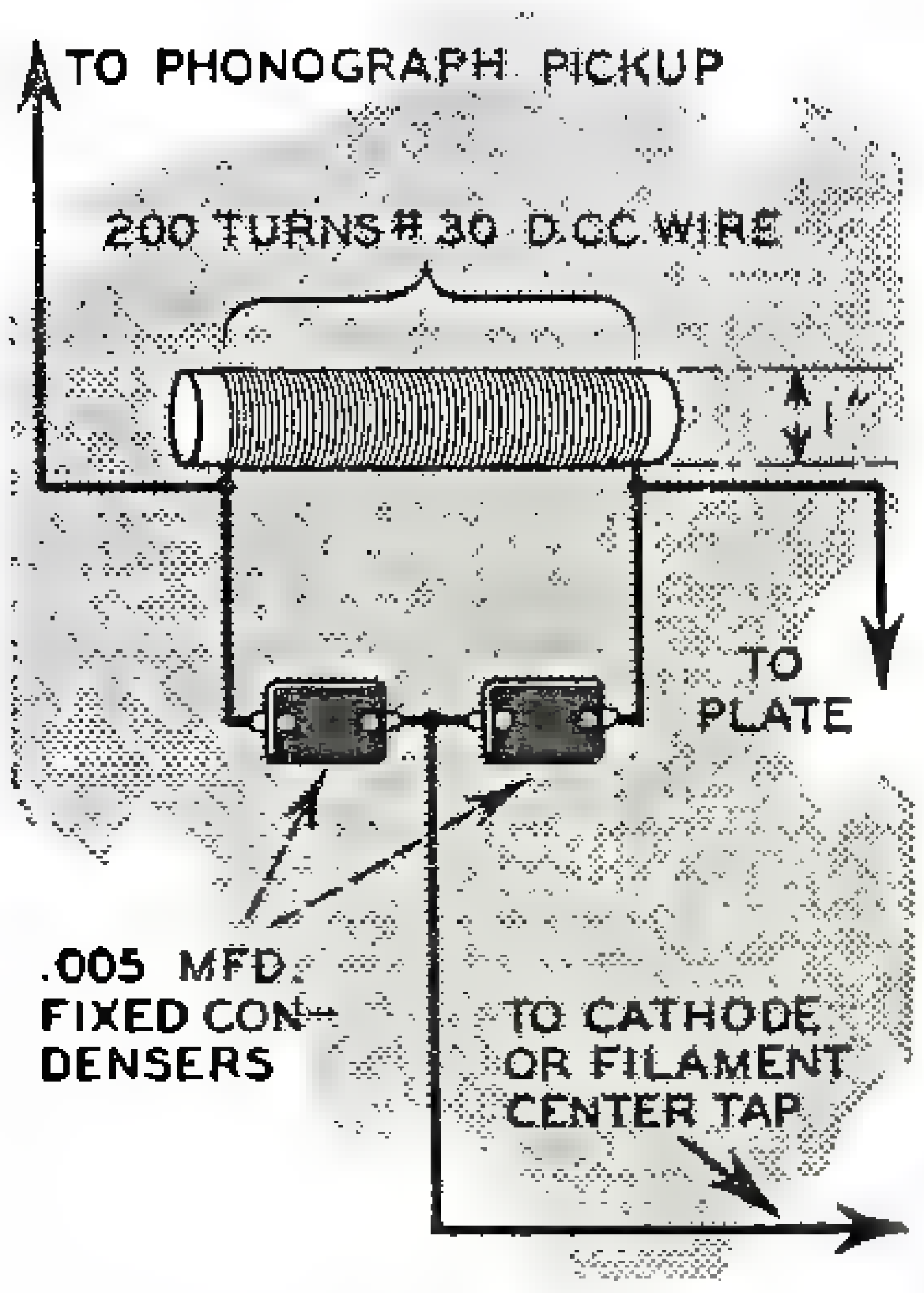
Sliding Rod Antenna Is Tuned to Stations to Stop Static

WHERE space for a receiving antenna for a short wave set is limited, this sliding brass curtain rod is ideal. The length of the rod is changed to tune the antenna to the station. A variocoupler connected in series with the antenna further tunes the picked up signals for loudest reception. An antenna like this greatly reduces static impulses and other interfering noises.

Though the volume obtained is surprisingly good, it is of course not equal to that to be had with an overhead antenna. A double throw switch can be used for switching to a regular antenna when reception is free from static.

In tuning slide the rod up and down and adjust variocoupler until reception is best.

Scratch Filter for Phono Pickup


TO PHONOGRAPH PICKUP
200 TURNS # 30 D.C.C. WIRE
1"
TO PLATE
.005 MFD. FIXED CONDENSERS
TO CATHODE OR FILAMENT CENTER TAP

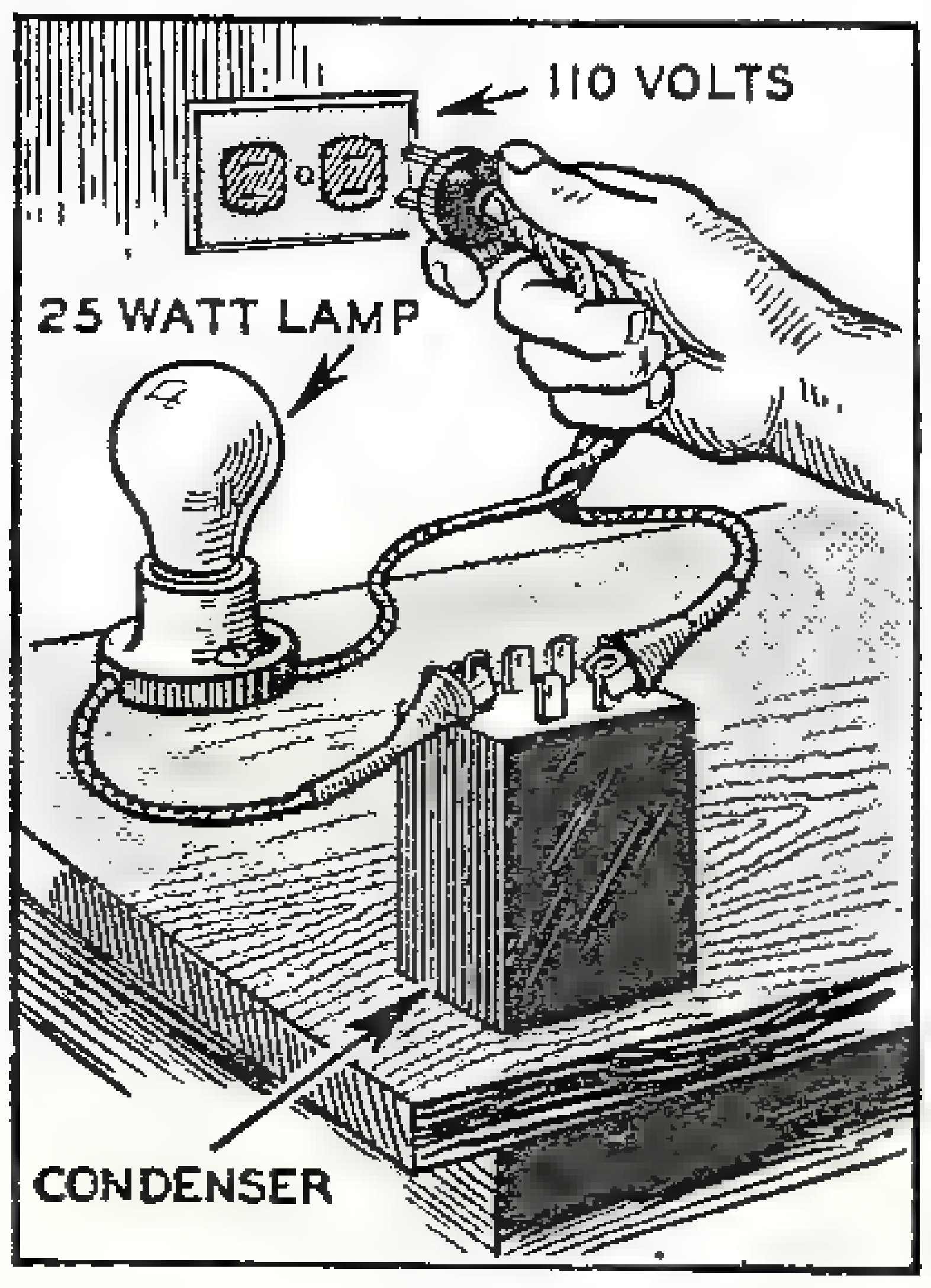
MANY of the older style phonograph pickups have no scratch filter, but one is easily constructed from a few spare parts.

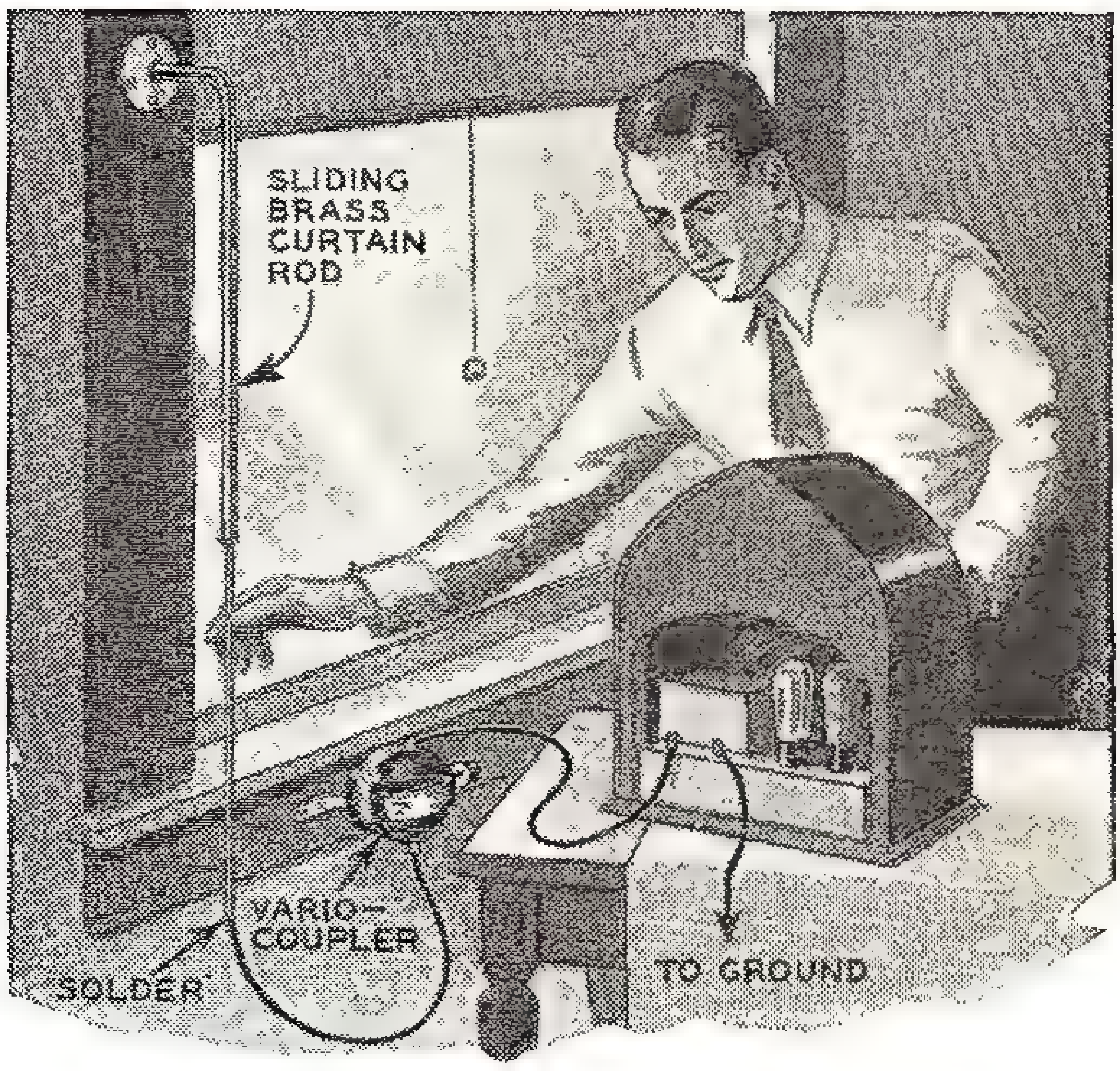
Wind about 200 turns of No. 30 d.c.c. wire closely together on a cardboard tube 1" in diameter. Connect this in series with the plate of the tube to which pickup is connected.

Connect two .005 fixed condensers in series across the choke coil. Run a wire from the center of the condensers to the cathode of the tube.

Test Condensers With Light Bulb

A TEST light is always handy on the radio workbench. With it you can make many continuity tests, and even check condensers. Connect a pair of test leads with clips to a bayonet plug, placing lamp socket in series with one of the leads. To test condensers plug into a 110 volt source, and connect clips to the condenser. If the bulb lights up the condenser is shorted. If it flashes for an instant, glows faintly, or is dark, the condenser is good.


110 VOLTS
25 WATT LAMP
CONDENSER

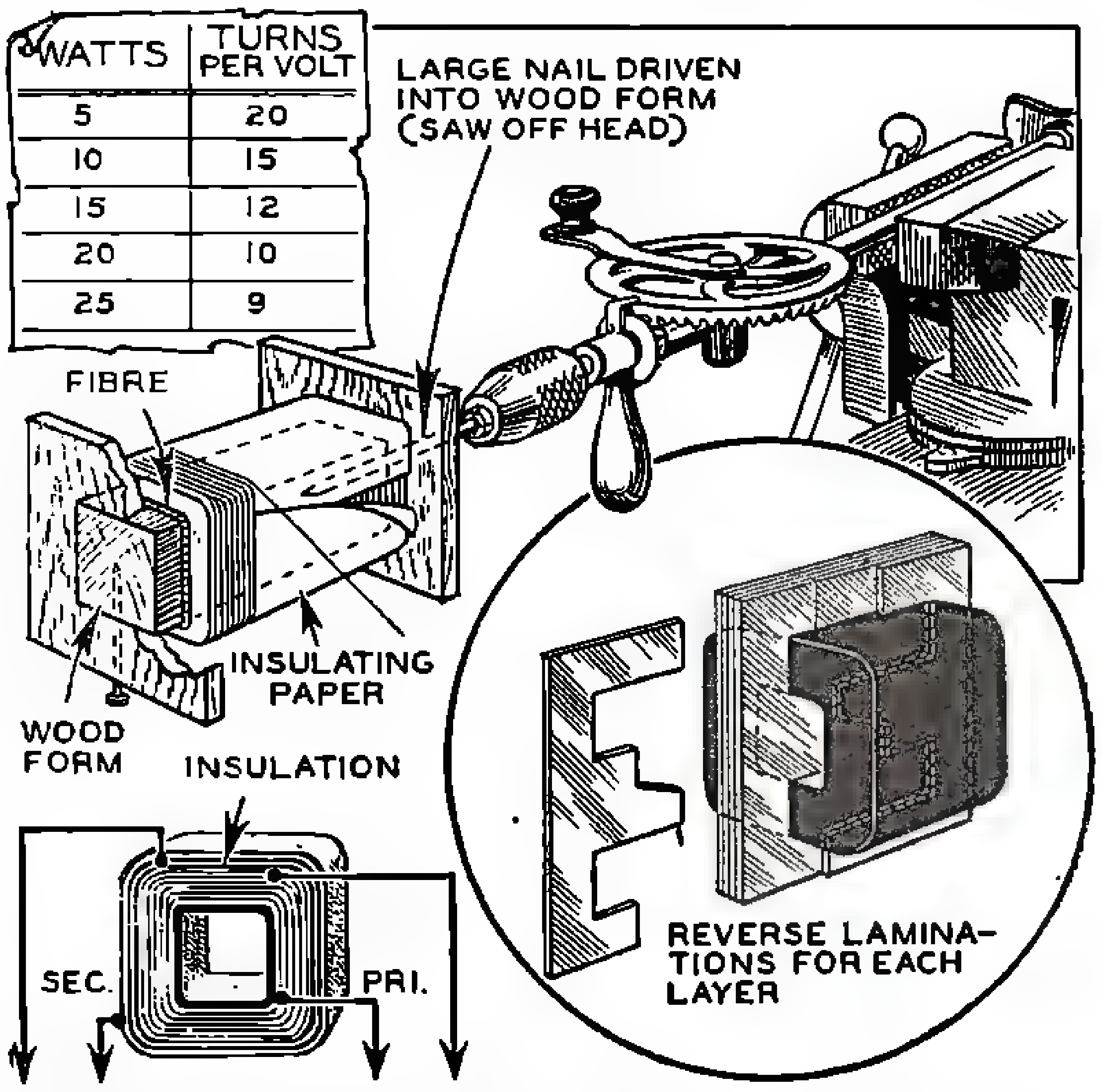

SLIDING BRASS CURTAIN ROD
VARIO-COUPLER
SOLDER
TO GROUND

Rod antenna may be fastened to window frame. Mark setting of rod for each station. Use 3 rod lengths if needed.

Winding Filament Transformers

THE cores of old audio transformers are often large enough for filament transformers. Use the fibre core of the old winding as a coil form, winding the primary on first. Run the winding across, but do not mind if the turns pile up on each other. Place a thin sheet of wax paper between each layer, and heavier insulation between primary and secondary. Measure the output voltage with a voltmeter, adding or subtracting turns to get the correct voltage when filament is connected.

Make a wood coil form and mount it in a breast drill held in a vise.



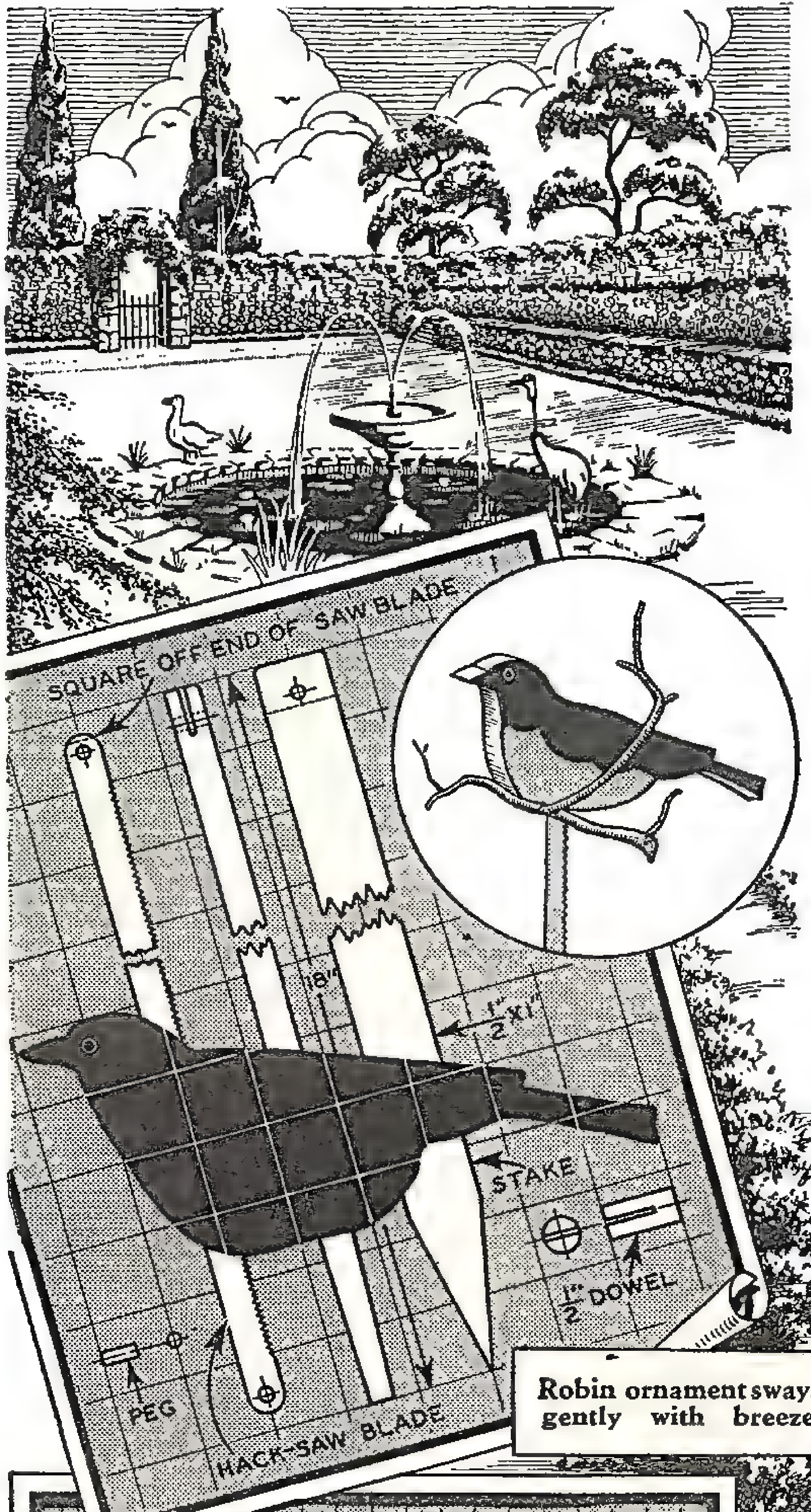
WATTS	TURNS PER VOLT
5	20
10	15
15	12
20	10
25	9

LARGE NAIL DRIVEN INTO WOOD FORM (SAW OFF HEAD)
FIBRE
INSULATING PAPER
WOOD FORM
INSULATION
SEC.
PRI.
REVERSE LAMINATIONS FOR EACH LAYER

Add 10% to filament wattage for losses to get primary watts. Multiply turns per volt given above for needed wattage by voltages to get turns per winding. Compute currents, and select correct enameled wires from wire table.

Animated Lawn Gadgets Sway in Wind

by A. NEELY HALL


SQUARE OFF END OF SAW BLADE
18"
$\frac{1}{2}$"X1"
STAKE
$\frac{1}{2}$" DOWEL
PEG
HACK-SAW BLADE

Robin ornament sways gently with breeze.

BIRDS and animals jig-sawed out of wood and mounted so that, with the slightest breeze, their bodies will sway, or their heads will nod, are a novel form of gadget to add interest to your garden. The three simple models shown here will suggest other subjects equally easy to make. Box boards, worn-out hacksaw blades, and other by-products of the house and shop furnish the working materials.

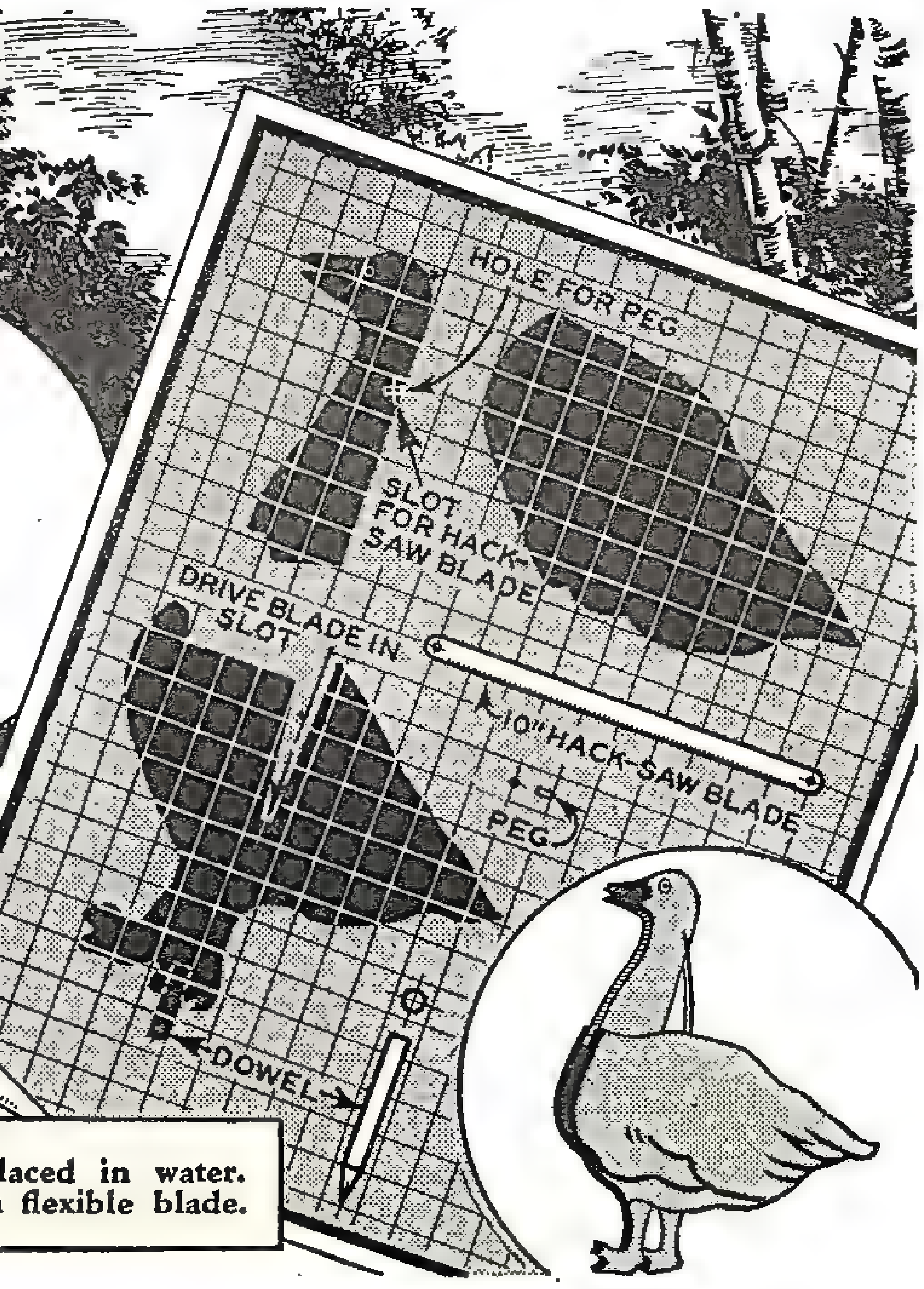
Lay out the robin upon a board ¾ inch thick, following the given pattern. The pattern may be enlarged directly upon the working material, or upon cardboard or wrapping paper, then transferred. The latter method provides a pattern for duplicate cut outs. Draw the squares of your enlarged pattern 1 inch across.

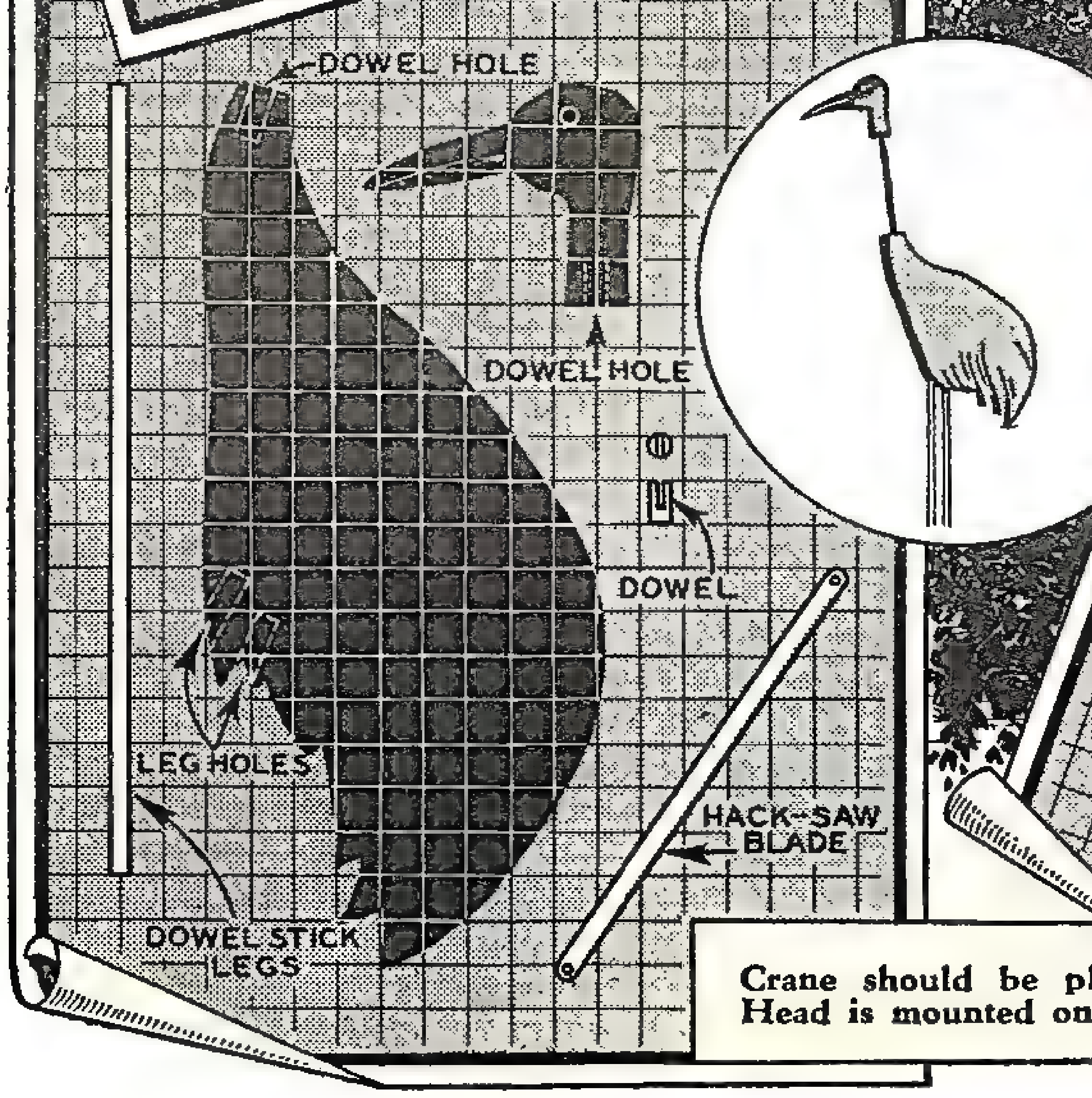
When you have cut out the bird block, smooth its edges with a file and sandpaper, and bore a ½" hole where indicated, for a dowel peg. Make the dowel 1" long, and slot two-thirds of its length. Slip a hacksaw blade end into the slot, coat the dowel with glue, and drive it into the bird block.

Cut the stake support about 16" long. Taper the bottom, slot the top to receive

(Continued on page 126)

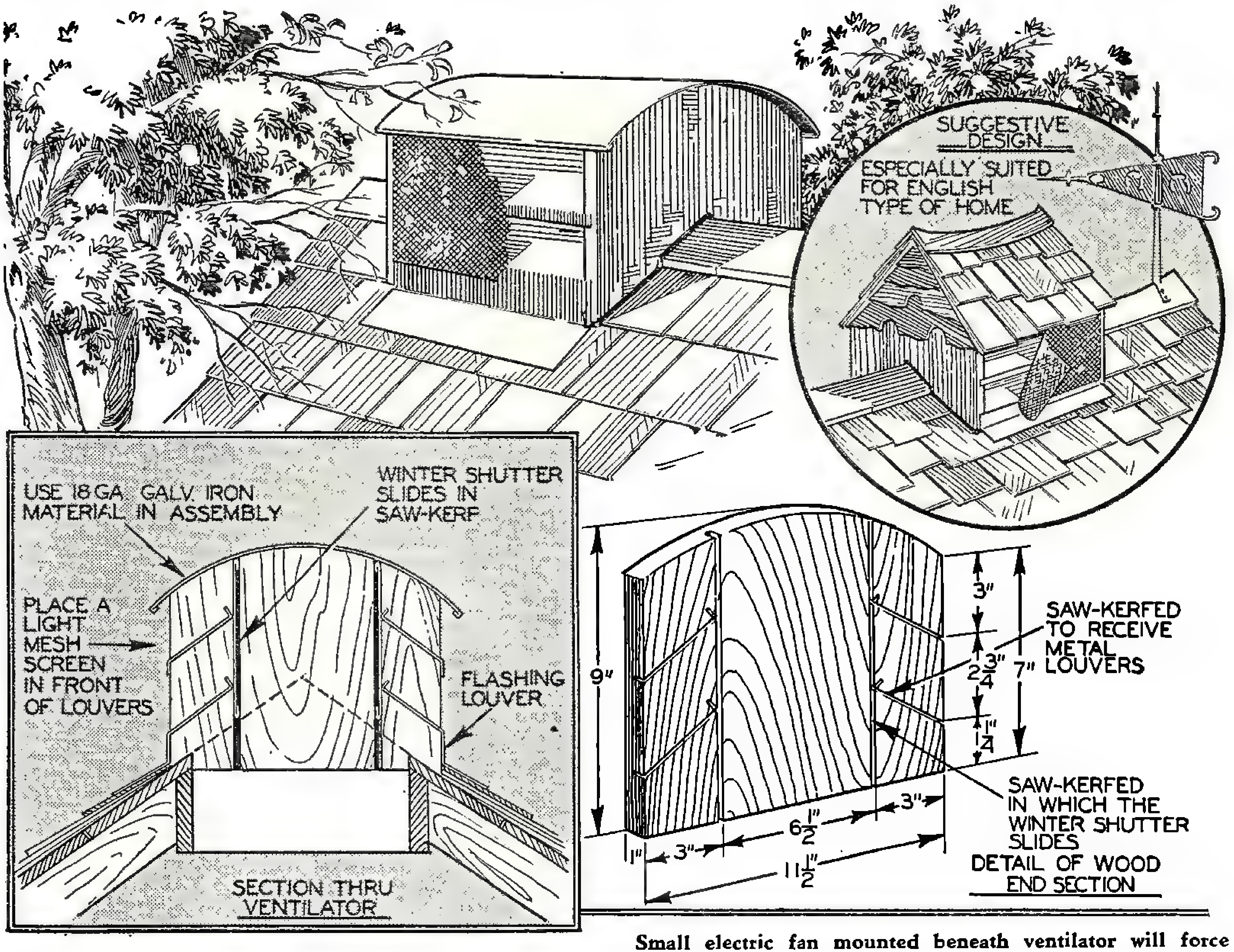
Lawn goose wags its head when wind blows. Make two wing sections, nailing one on each side of body section. Goose is supported by dowel extending into one leg.


HOLE FOR PEG
SLOT FOR HACK-SAW BLADE
DRIVE BLADE IN SLOT
10" HACK-SAW BLADE
PEG
DOWEL


DOWEL HOLE
DOWEL HOLE
DOWEL
LEG HOLES
DOWEL STICK LEGS
HACK-SAW BLADE

Crane should be placed in water. Head is mounted on flexible blade.

Keep Rooms Cool in Summer With This Attic Ventilator


SUGGESTIVE DESIGN
ESPECIALLY SUITED FOR ENGLISH TYPE OF HOME
USE 18 GA. GALV. IRON MATERIAL IN ASSEMBLY
WINTER SHUTTER SLIDES IN SAW-KERF
PLACE A LIGHT MESH SCREEN IN FRONT OF LOUVERS
FLASHING LOUVER
SECTION THRU VENTILATOR
9"
3"
$2\frac{3}{4}$"
7"
$1\frac{1}{4}$"
SAW-KERFED TO RECEIVE METAL LOUVERS
SAW-KERFED IN WHICH THE WINTER SHUTTER SLIDES
1"
3"
$6\frac{1}{2}$"
3"
$11\frac{1}{2}$"
DETAIL OF WOOD END SECTION

Small electric fan mounted beneath ventilator will force out hot air on calm days. Bend louvers at upper ends to keep out heavy rains. Use screens to keep out insects.

THE attic is generally the hottest part of the home in summer. The sun beating down all day long on the roof concentrates the heat here, making the rooms below very uncomfortable during the night. This concentration of heat in the attic must be removed before living and sleeping rooms can be made comfortable in the summer.

This ventilator, designed along the lines of the barn cupola, will draw heat out of the house. Only one need be installed on any roof; with a little care the ventilator can be made to appear an integral part of the house.

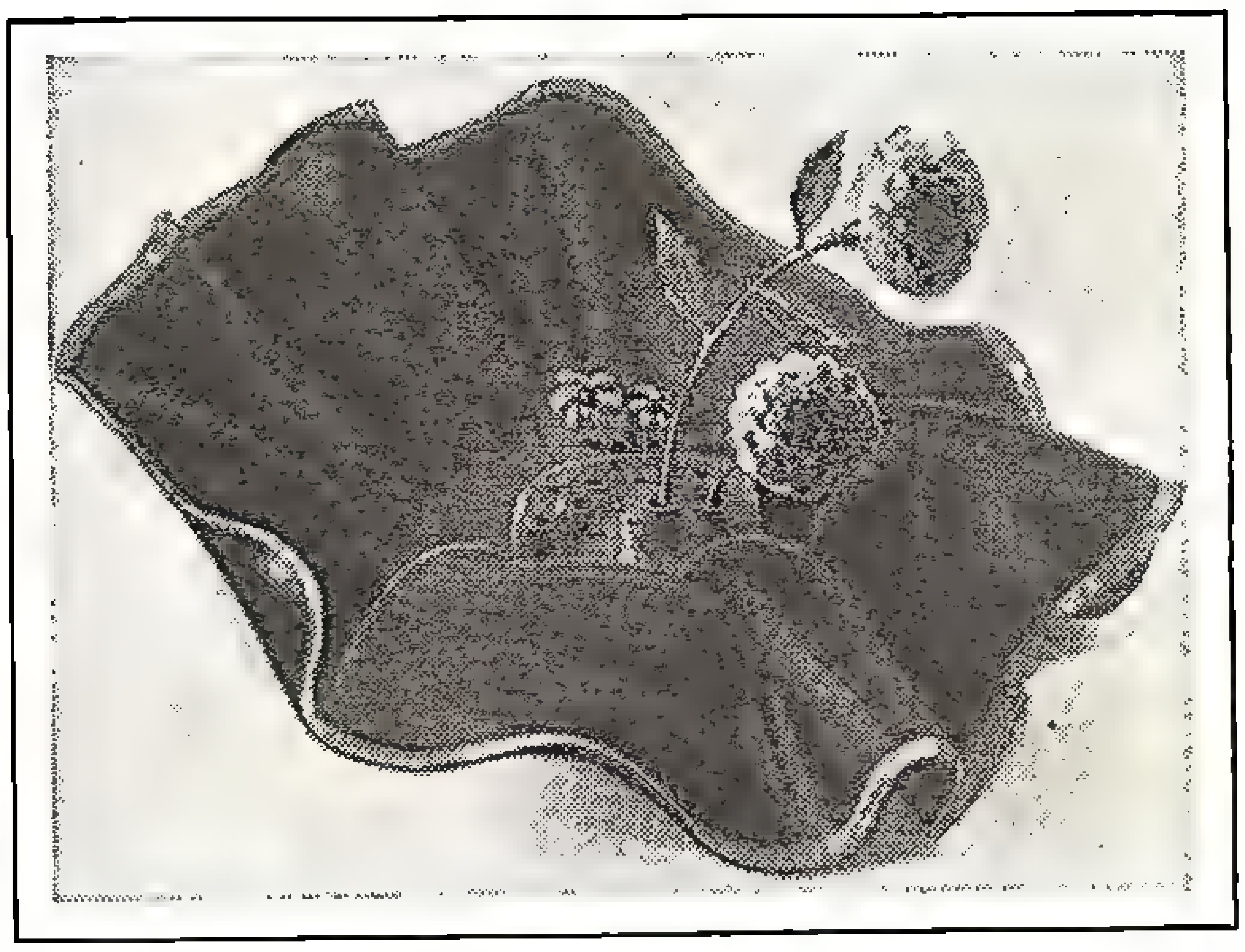
The unit is made 14″ long, to just fit between the rafters. The ends are of white pine, and are saw-kerfed to receive the metal louvers. Removable shutters which seal up the ventilator for the winter also slide in saw kerfs.

If simplicity is desired, a metal roof may be used. Many prefer to use a boarded roof, finishing with shingles to harmonize with the home.

Give the entire unit a coat of aluminum paint, and then decorate in colors to match the roof. When mounting the ventilator use plastic roof cement at the joints.

If using the ventilator on a two-story house, leave the door to the attic open during the day to give a better draft.

Vases From Phonograph Records

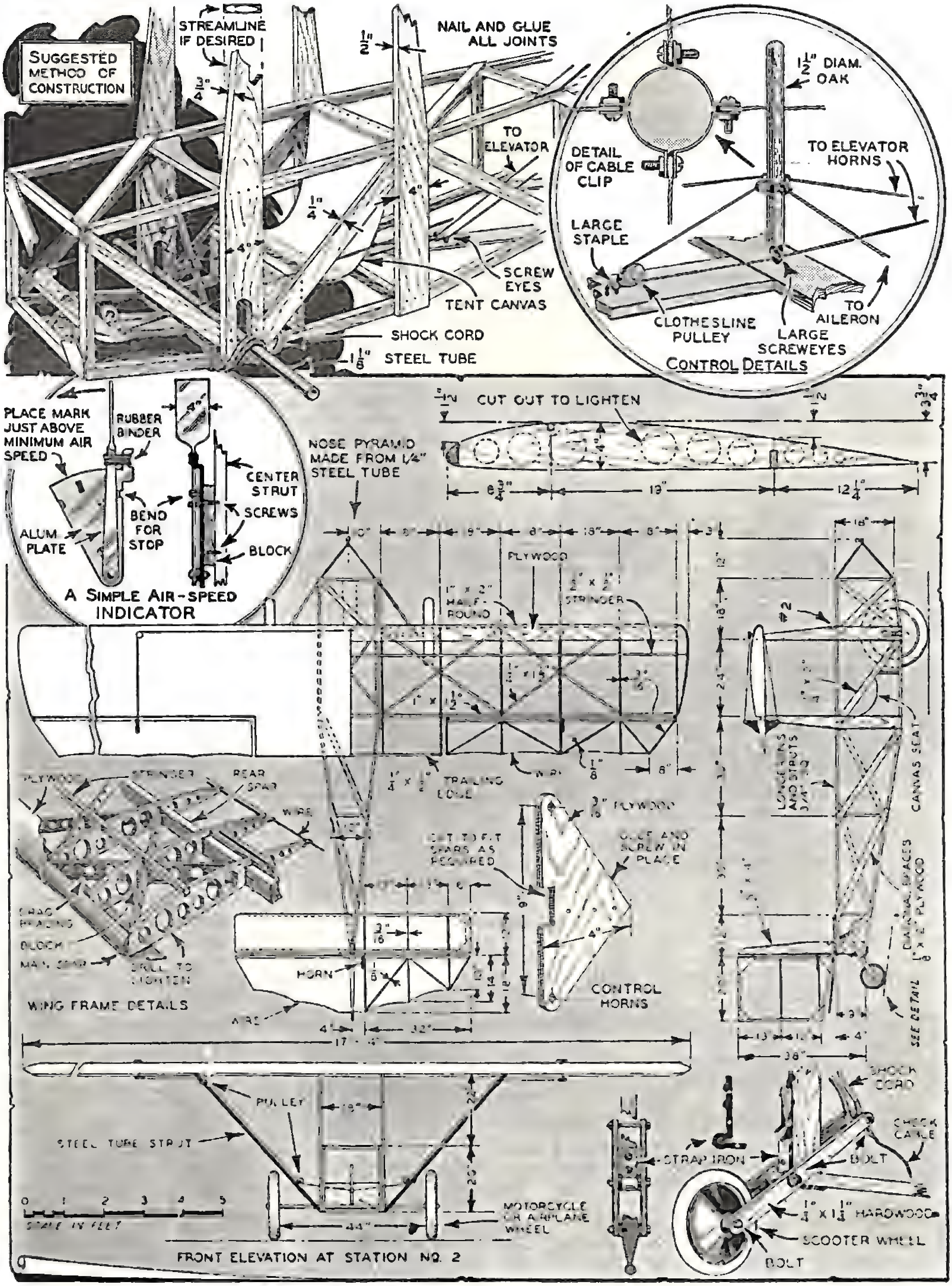


Flower vase holder made by heating and bending old phonograph record. Edges may be painted in any color scheme.

OLD phonograph records, when heated with hot water or held over a gas flame, become pliable. Vases and nut dishes can be made by softening record, placing bottle in center and molding edges to desired design. Finished vase will have lovely velvety finish, and may be painted.

Dip the vase in warm water after forming to relieve strains.

Real Flying Thrills Are Yours

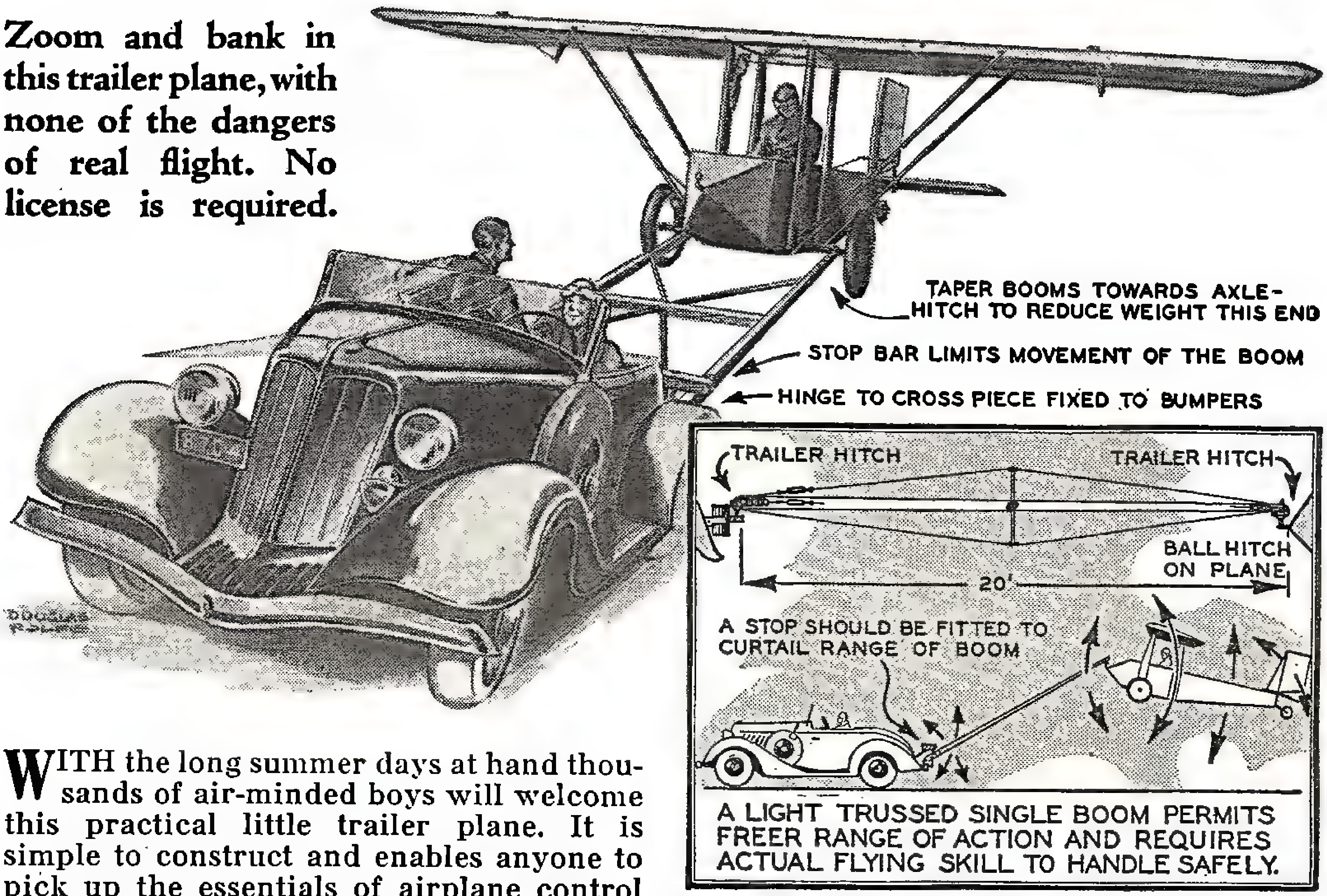

SUGGESTED METHOD OF CONSTRUCTION
STREAMLINE IF DESIRED
3/4"
1/2"
NAIL AND GLUE ALL JOINTS
TO ELEVATOR
4"
1/4"
4"
SCREW EYES
TENT CANVAS
SHOCK CORD
1 1/8" STEEL TUBE
DETAIL OF CABLE CLIP
1 1/2" DIAM. OAK
TO ELEVATOR HORNS
LARGE STAPLE
CLOTHESLINE PULLEY
LARGE SCREWEYES
TO AILERON
CONTROL DETAILS
PLACE MARK JUST ABOVE MINIMUM AIR SPEED
RUBBER BINDER
ALUM PLATE
BEND FOR STOP
CENTER STRUT
SCREWS
BLOCK
A SIMPLE AIR-SPEED INDICATOR
NOSE PYRAMID MADE FROM 1/4" STEEL TUBE
CUT OUT TO LIGHTEN
3 3/4"
6 3/4"
19"
12 1/4"
PLYWOOD
1" x 2" HALF-ROUND
1/2" x 1/2" STRINGER
1" x 1 1/2"
1/4" x 1/2" TRAILING EDGE
WIRE
1/8"
8"
18"
3"
12"
18"
24"
#2
LONGERONS AND STRUTS 3/4" SQ.
CANVAS SEAT
DIAGONAL SPACES 1/8" x 2" PLYWOOD
SEE DETAIL
13"
12"
4"
38"
PLYWOOD
STRINGER
REAR SPAR
WIRE
DRAG BRACING
BLOCK
MAIN SPAR
DRILL TO LIGHTEN
WING FRAME DETAILS
3/16" PLYWOOD
CUT TO FIT SPARS AS REQUIRED
GLUE AND SCREW IN PLACE
9"
4"
CONTROL HORNS
3/16"
HORN
WIRE
4"
32"
17' - 4"
PULLEY
19"
22"
26"
STEEL TUBE STRUT
0 1 2 3 4 5
SCALE IN FEET
44"
MOTORCYCLE OR AIRPLANE WHEEL
FRONT ELEVATION AT STATION NO. 2
STRAP IRON
SHOCK CORD
CHECK CABLE
BOLT
1/4" x 1 1/4" HARDWOOD
SCOOTER WHEEL
BOLT

Constructional details for trailer plane are shown above. Straight-grained spruce should be used for all important members, and any light, straight-grained wood for other parts. Strips of inner tube may be used in place of shock cord to cushion landings. Airspeed indicator shown above will prevent crashes. It may be calibrated against speedometer of car. Strong disc wheels with rubber tires are necessary if towing plane considerable distance on the ground.

With this Captive Plane

by DOUGLAS ROLFE

Zoom and bank in this trailer plane, with none of the dangers of real flight. No license is required.


TAPER BOOMS TOWARDS AXLE-HITCH TO REDUCE WEIGHT THIS END
STOP BAR LIMITS MOVEMENT OF THE BOOM
HINGE TO CROSS PIECE FIXED TO BUMPERS
DOUGLAS ROLFE
TRAILER HITCH
TRAILER HITCH
BALL HITCH ON PLANE
20'
A STOP SHOULD BE FITTED TO CURTAIL RANGE OF BOOM
A LIGHT TRUSSED SINGLE BOOM PERMITS FREER RANGE OF ACTION AND REQUIRES ACTUAL FLYING SKILL TO HANDLE SAFELY.

No special knowledge of aviation is needed to build or fly captive plane, nor is license required. Auto is power unit.

WITH the long summer days at hand thousands of air-minded boys will welcome this practical little trailer plane. It is simple to construct and enables anyone to pick up the essentials of airplane control with a minimum of risk and cost.

Being entirely dependent upon a tow car, to which it is securely attached at all times during operation, and being definitely limited to a prescribed area of actual manipulation, the dangers ordinarily connected with preliminary flight instruction are completely eliminated.

Furthermore the plane itself does not have to be stressed to any particularly high standard of structural safety (though common sense dictates sturdy and careful construction). The plans on the opposite page provide a method of construction which is unique in its simplicity and strength. They are more than adequate for the purpose intended.

As will be seen from a glance at the diagrams, either of two hitches may be employed. In practice it will probably be found that *both* are needed: The double-boom hitch limits movements of the trailer to simple up and down flight and is recommended for the rank novice who has yet to master the intricacies of lateral control. Advanced "students" will revel in the freedom of movement which the single-boom flexible-joint hitch permits. Lateral control and even banked turns are possible with this hook-up.

As the plane is at all times within easy speaking distance of the tow car, instruction can be given during "flight" and errors of control pointed out immediately they become apparent.

Any sudden decrease of speed by the tow car should be avoided while the trailer is aloft. A good plan is to have a second man in the car ready to signal any intention to slow down or stop. This will give the student ample time to put the nose down and "land."

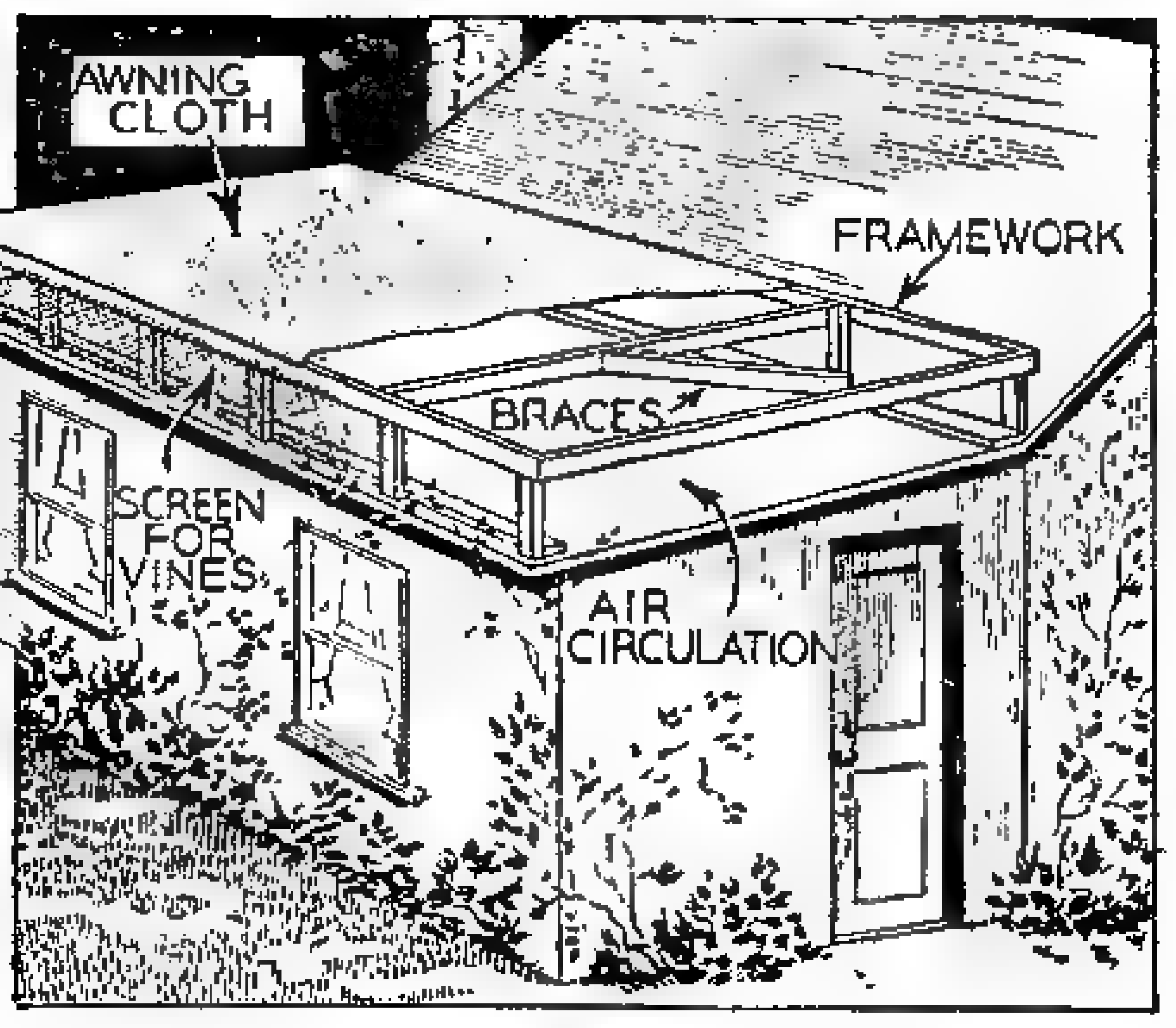
Better still, a simple air speed indicator can be made as shown in the drawings and the student coached to set the ship down the moment the pointer passes the mark indicating danger. This mark should be predetermined in actual tests to ascertain the exact speed required to maintain flight.

This training plane is designed to operate at speeds *not to exceed 30 miles an hour.* Unless a stronger and altogether more ambitious type of plane is used this rule must be rigidly observed. As a matter of fact it may be said that no more speed is necessary than slightly over the bare amount required to keep the trainer in the air. Play safe and thus avoid trouble.

The actual method of construction is covered in the plans. It will be seen that the

(Continued on page 126)

TIMELY SUMMER IDEAS

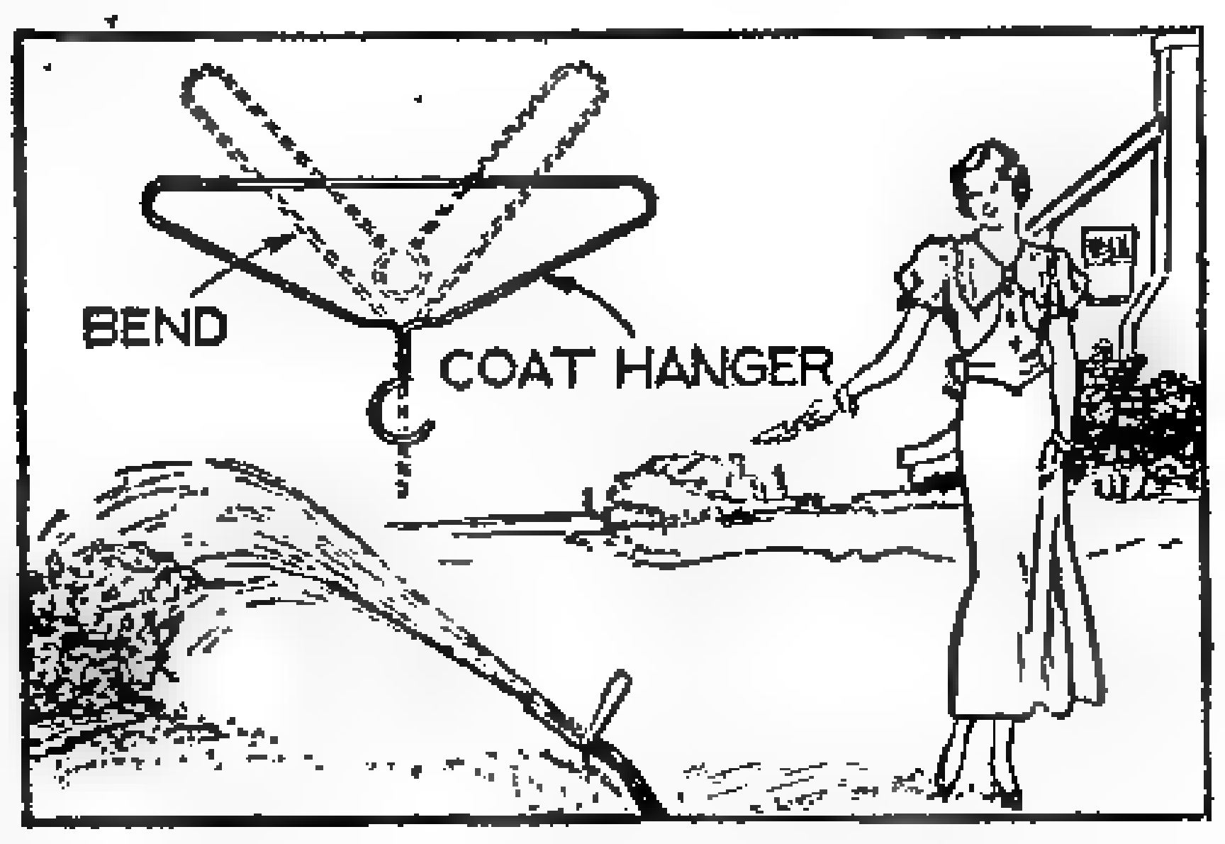


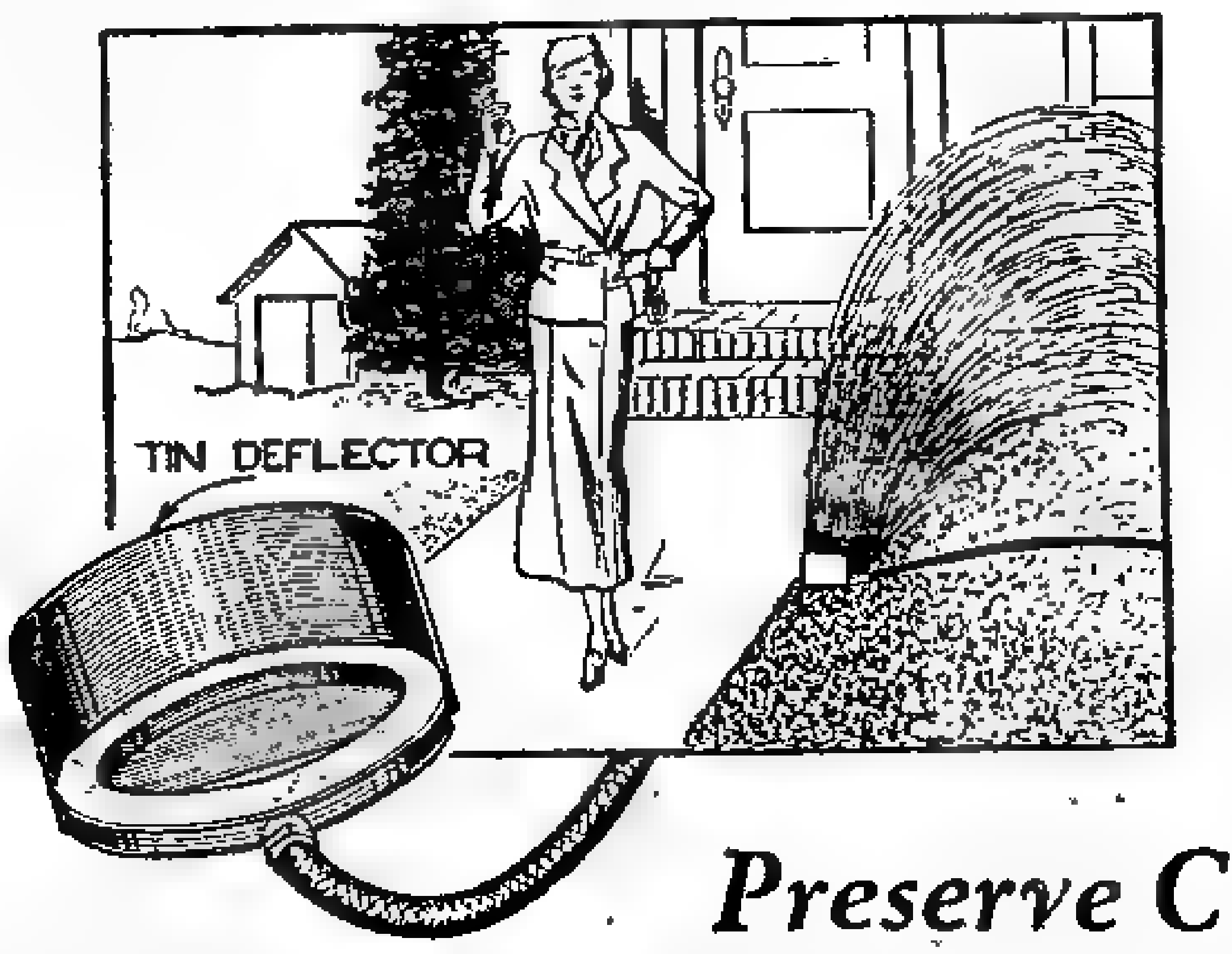
Roof Awning Cloth Keeps Workshop Cooler

A CANVAS roof awning built on a light wood frame will keep a workshop or summer kitchen under a flat roof at least ten degrees cooler in summer. This type of roof protection is used extensively on houses and barns by ranchers in the super-hot Imperial Valley of California. Tack white awning cloth to the framework to provide a 12" air layer just above the roof. Keep the ends open for air circulation. White pine ¾"x2" will be ideal for the framework and for the braces.—Hi Sibley.

Coat Hanger Makes Handy Garden Hose Support

SOME sort of hose support is needed when using a nozzle on garden hose to water the flower bed. An ordinary wire garment holder bent as shown at right will be found handy for this purpose. Make a snug fit around the nozzle, and straighten out the hooked end which is to be pushed into the ground.—O. Edlund.



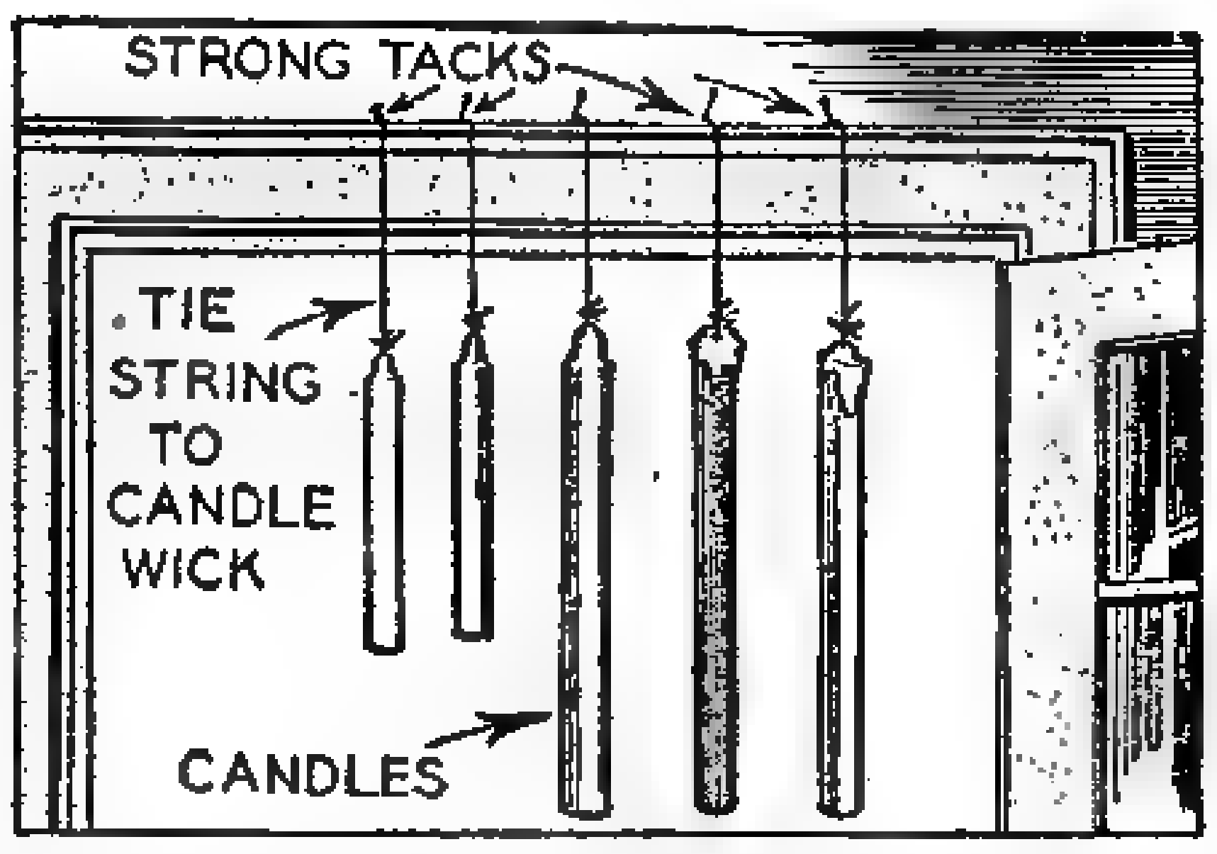


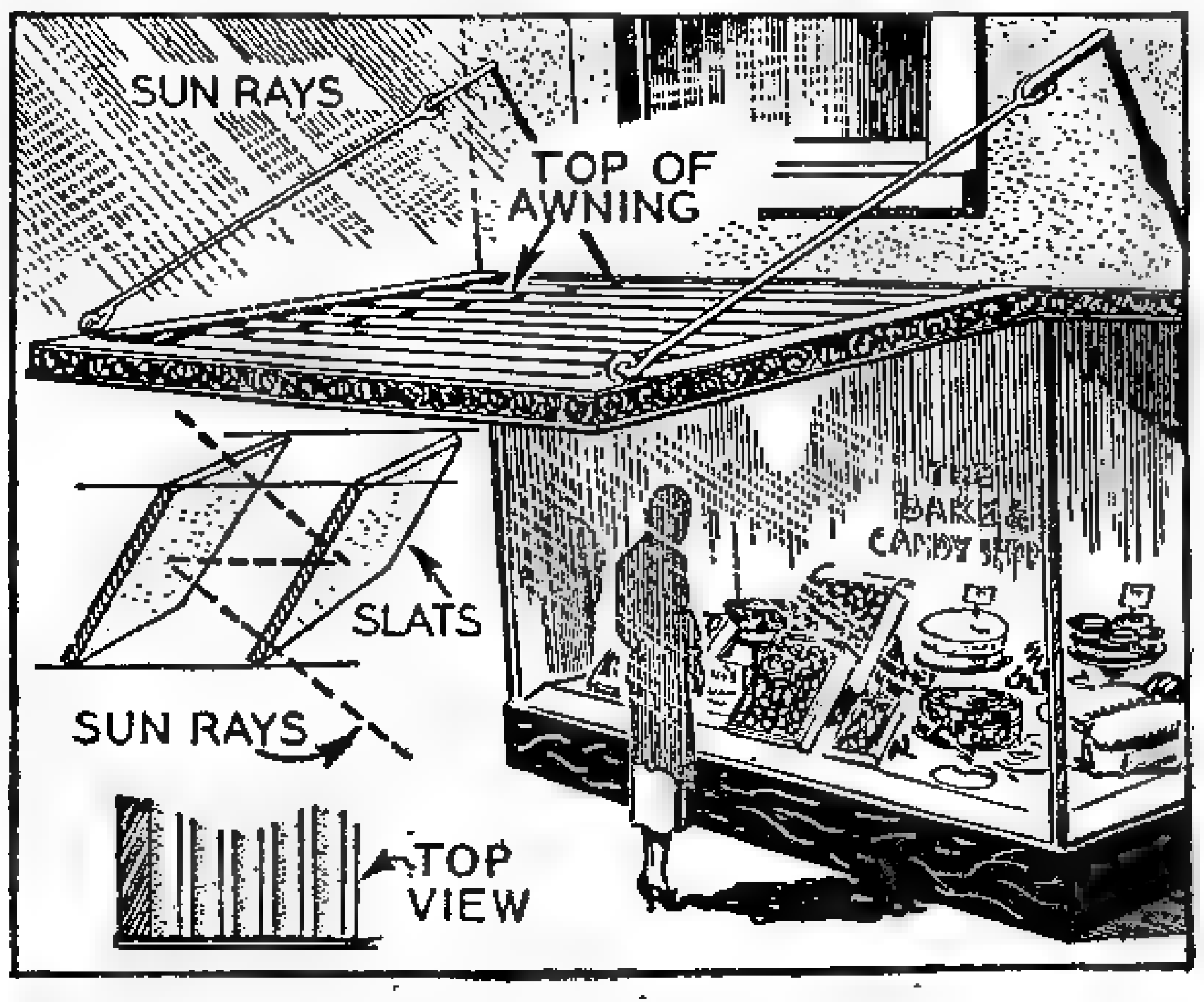
Tin Guard for Lawn Sprinkler Is Easily Made

IT IS a real problem to water the lawn thoroughly in all places with the circular sprinkler without wetting the sidewalk or house. To overcome this difficulty make a tin deflector to fit around one side of the sprinkler. If a large enough tin can is available, it may quickly be cut down to the desired shape, using the bottom and one side. Bend the top of the guard as needed to keep the water off the sidewalk as shown at left.—L. W. Degree.

Preserve Candles in Warm Weather

MANY people on returning from their vacations find that all the candles have lost their shape. If these bent candles are hung up in a warm place by tying strings to the wicks, they will be in their original shape in a few days. It will be even better to hang the candles up in this manner before the warm days come, for then there will be no bending.—R. H. Johnstone.


STRONG TACKS
TIE STRING TO CANDLE WICK
CANDLES

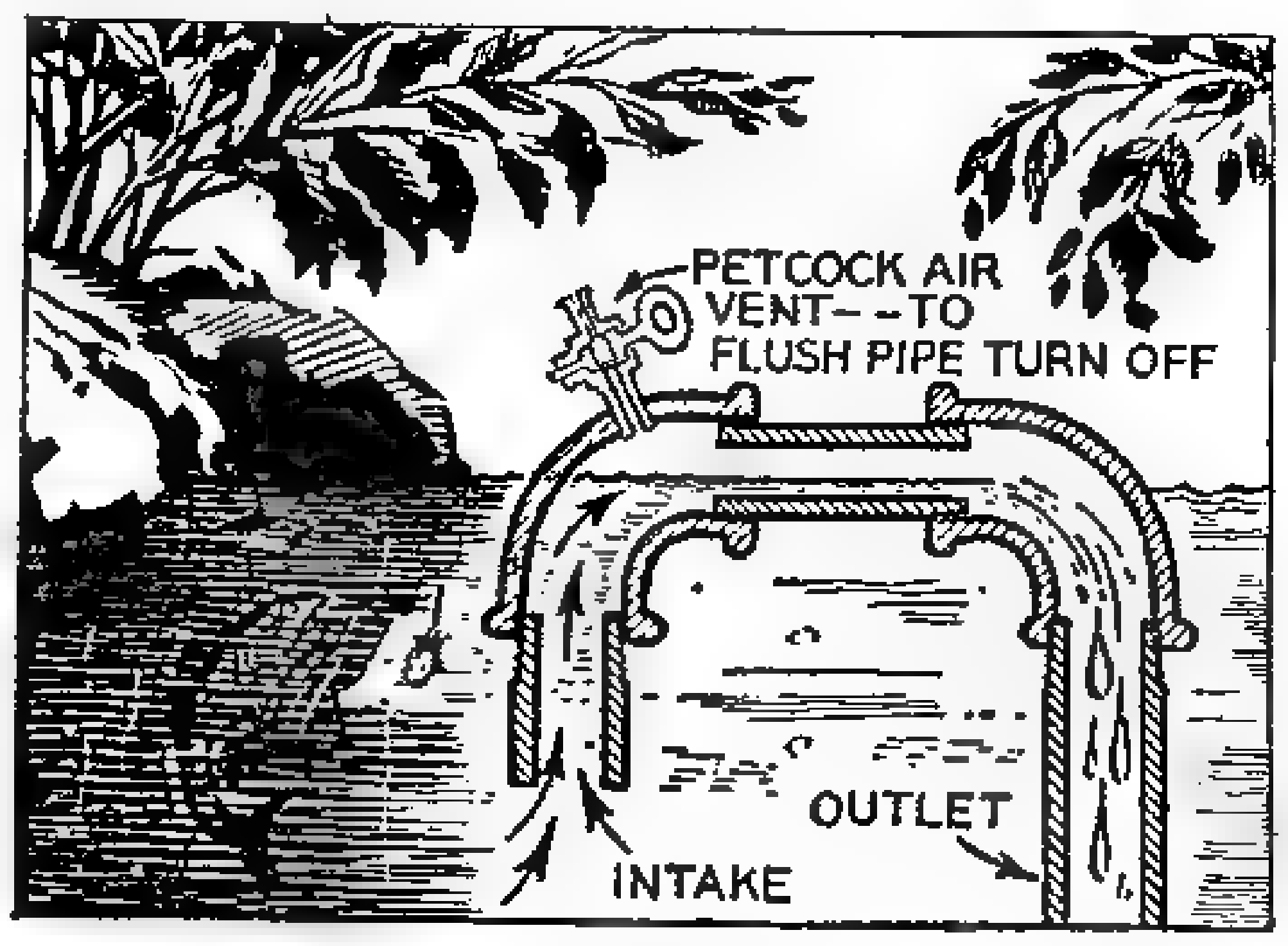


Slat Awning Keeps Store Windows Cool

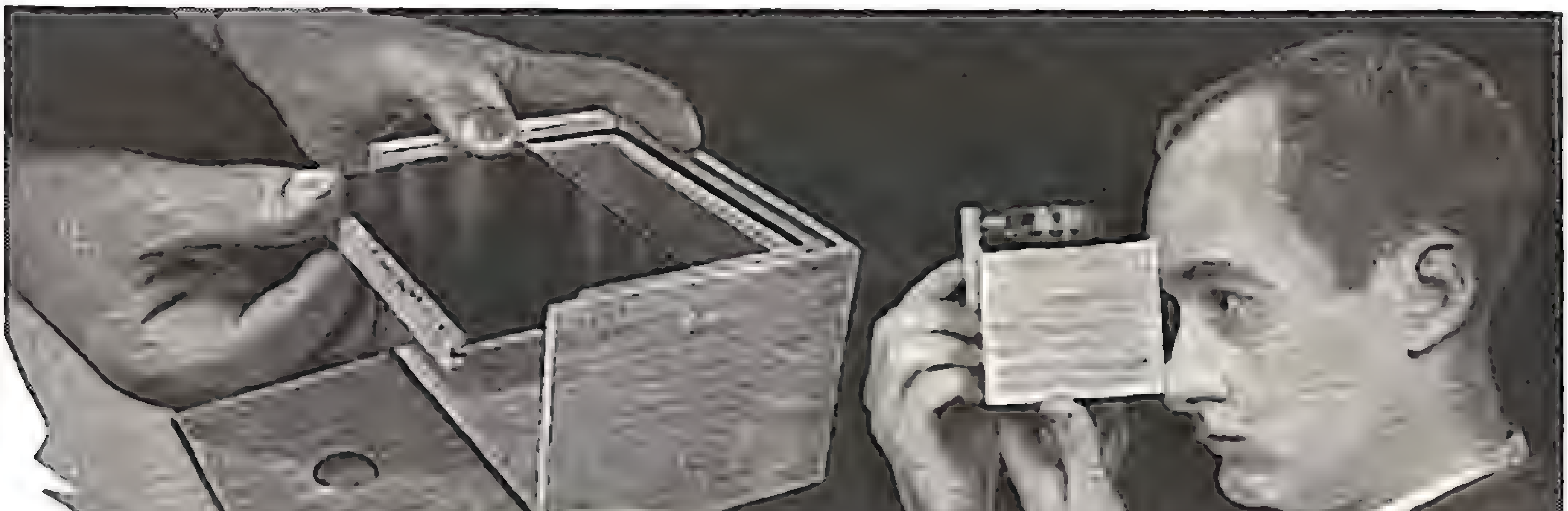
AN AWNING which will protect the show windows of stores, keeping the direct sunlight from fading materials and melting perishable products, but still provide indirect lighting for the displays is badly needed during the hot summer days. An awning made up of wood slats mounted side by side on a slant is ideal for this purpose. The sun's beams strike the upper surfaces of the slats, reflect off to the under surface of the adjoining slat, and then go down to the window.—E. F. Folger.

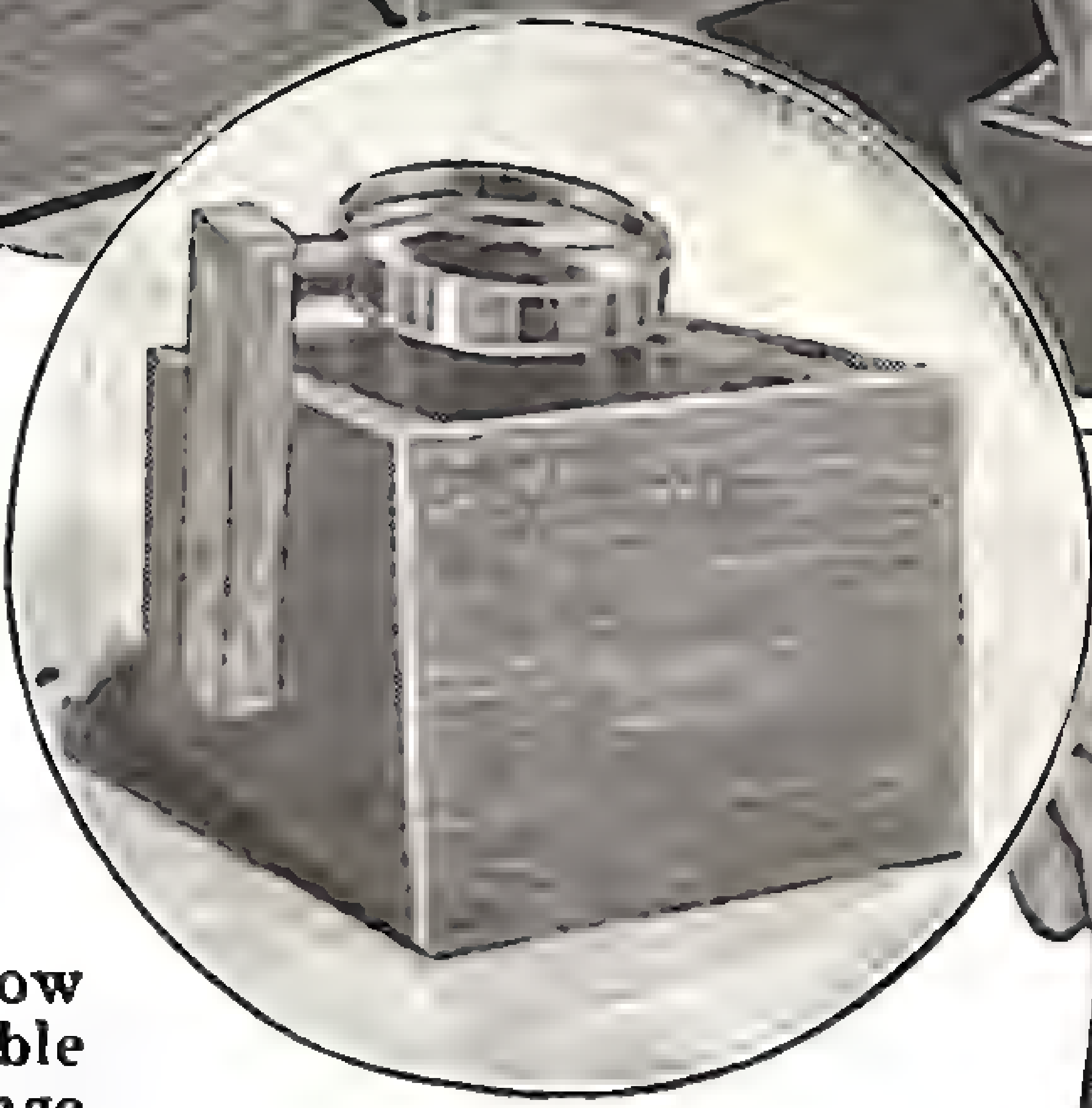
Novel Pool Drain

MOST overflow pipes on garden fish ponds soon become clogged with leaves, litter, or moss because of the need of a screen across the opening. By fitting two elbows and a short section of pipe to the outlet as shown the opening is under water where there is no debris. It is important to drill a ⅛" hole in one elbow, above the pool level, to prevent any siphoning action. The pool may be easily drained by closing off this hole with a petcock, and letting water siphon out.—K. W. James.



Find Gold With Magic Black Light Box





Above: Pane of purple ultra heat-resisting glass is fitted into grooves in top of box—piece costing about one dollar is large enough. Right: Mount ordinary hand magnifying glass over purple glass as shown, so it can be adjusted to any position. Cut hole in side of box.

Look at mineral samples through small hole in box; if they glow in same degree and color they are the same composition.

Cigar box containing labeled specimen ores is used with magic box to identify unknown ores.

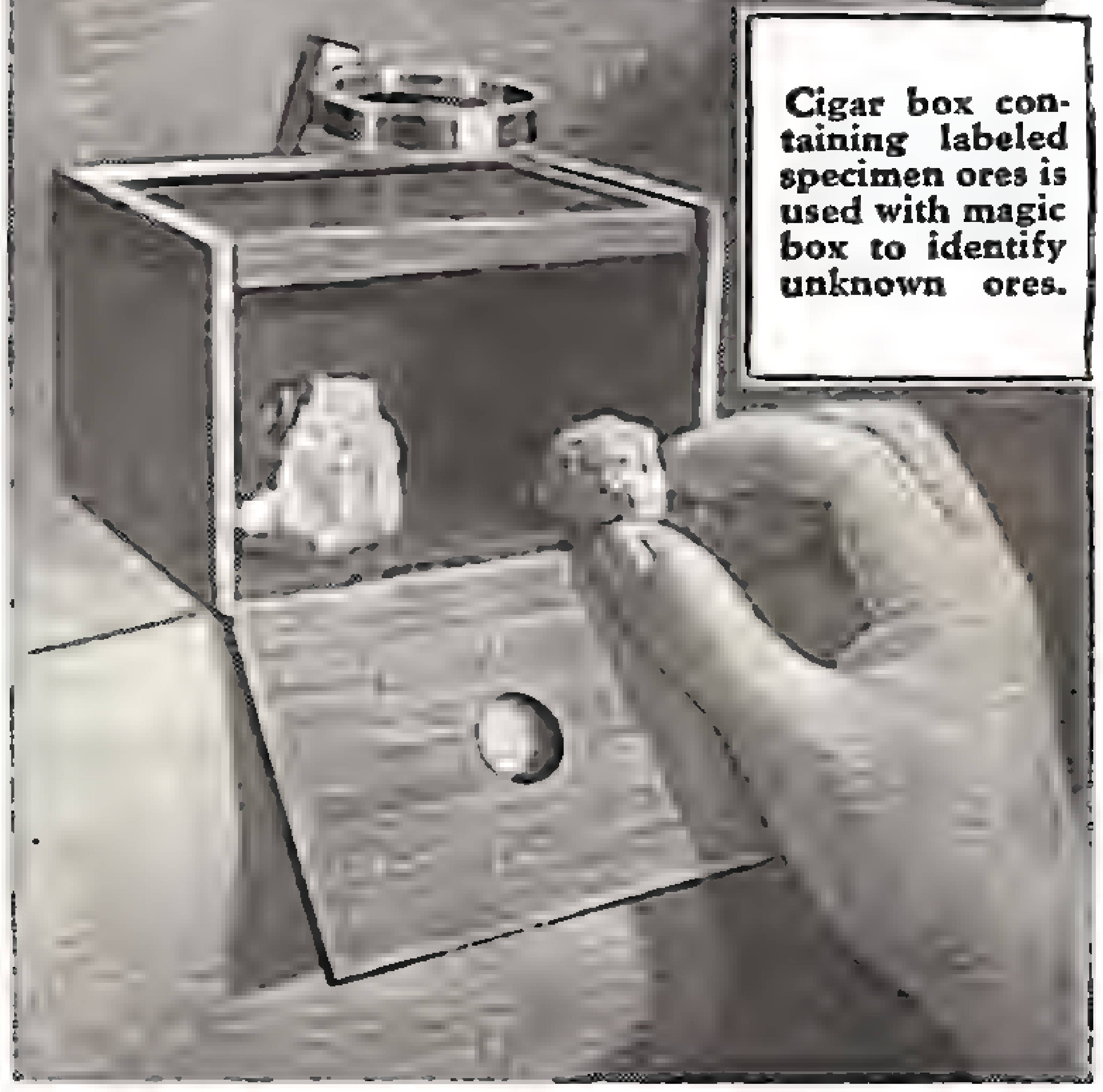
BLACK light now makes it possible to match strange ores with known specimens. Under this ultra-violet radiation gold ores will glow in a characteristic color and brilliance which is easily identified.

The black light box is made of pieces of cigar box wood. Paint the inside with dead black paint, and make a small hole in the hinged side. A pane of purple glass is fitted into the top to cut off all but the ultra-violet or black light rays. An adjustable magnifying lens mounted above the pane concentrates the rays of the sun.

A box of assorted, labeled ore specimens must be obtained to start with. Select from the box a sample which most resembles the piece of mineral being tested. Place both in the box, adjust the lens to catch the greatest possible amount of sunlight, and look at the ores through the hole. If the strange ore gives off a fluorescence similar to that of the known specimen it is instantly identified. Otherwise try another sample.

Be sure to view a strange ore specimen from all sides. One piece may glow with several different colors, indicating a mixture of ores.

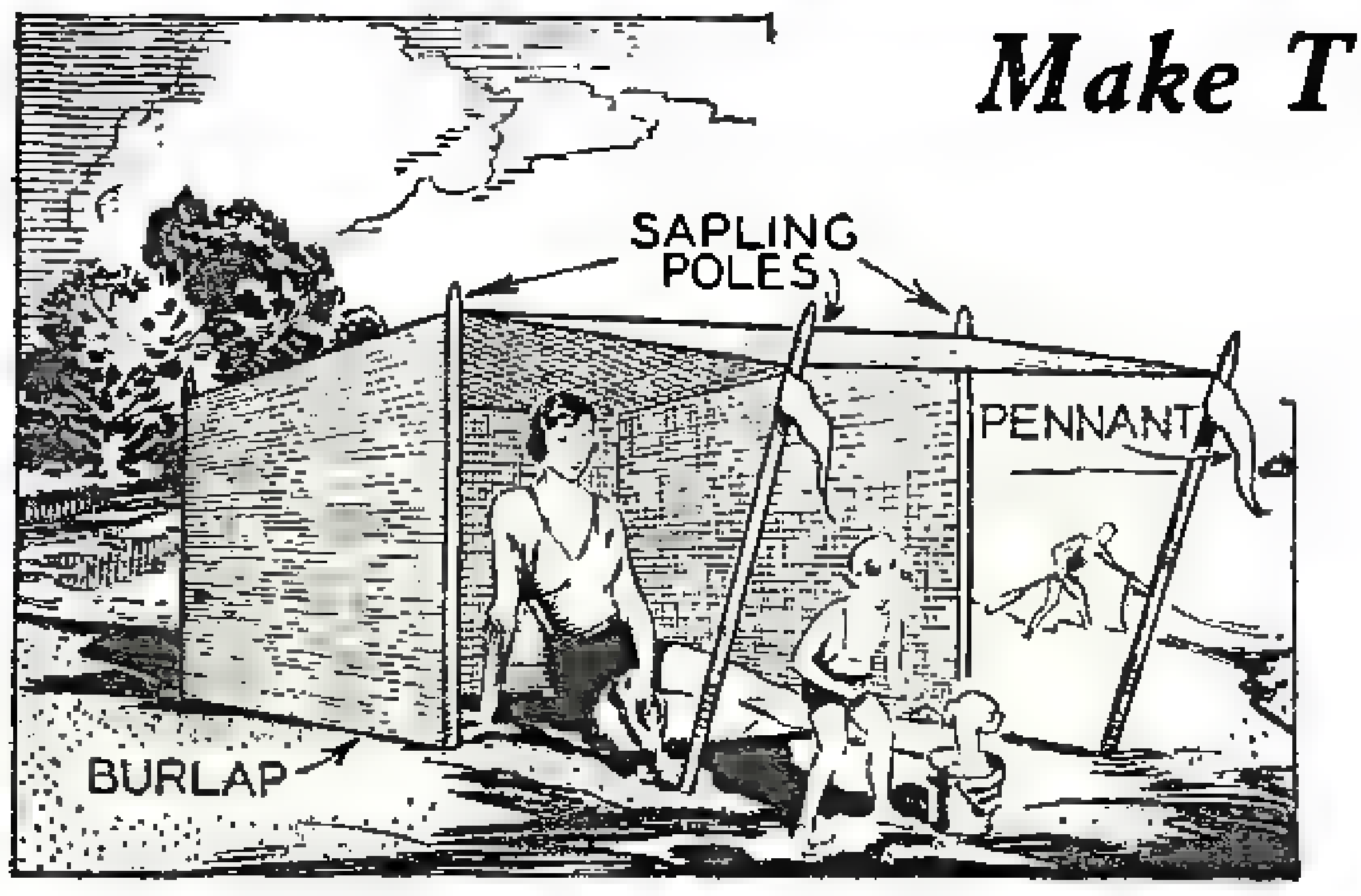
The indoor experimenter can use an arc lamp as a light source. Forgeries can be detected, oil made luminous, and secret writing inks made visible.



Placing piece of strange ore in box with known specimen. Inspect ore specimens from all sides before discarding.

VACATIONING HANDIKINKS

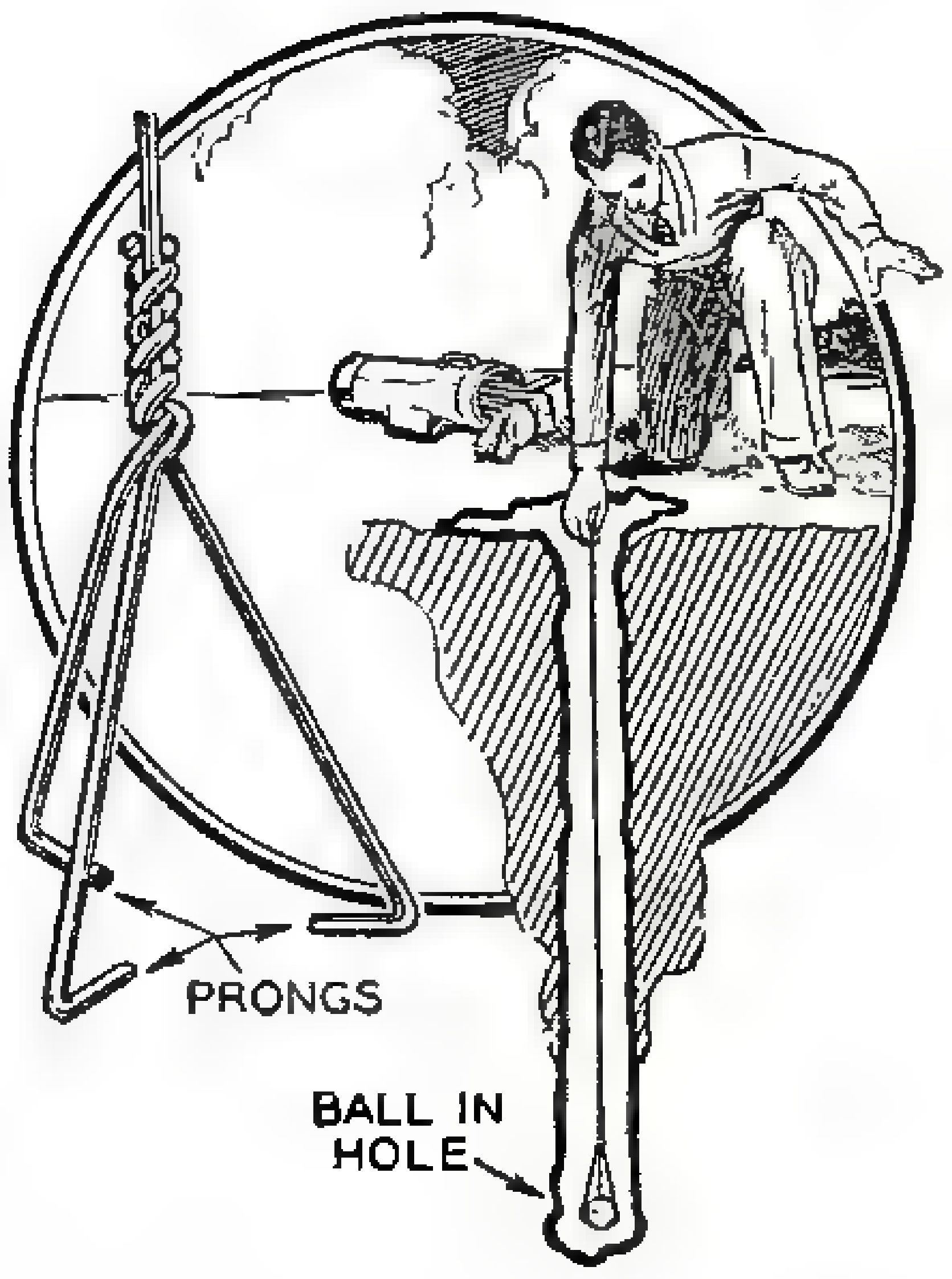
Make This Gay Cabana for Your Swimming Beach



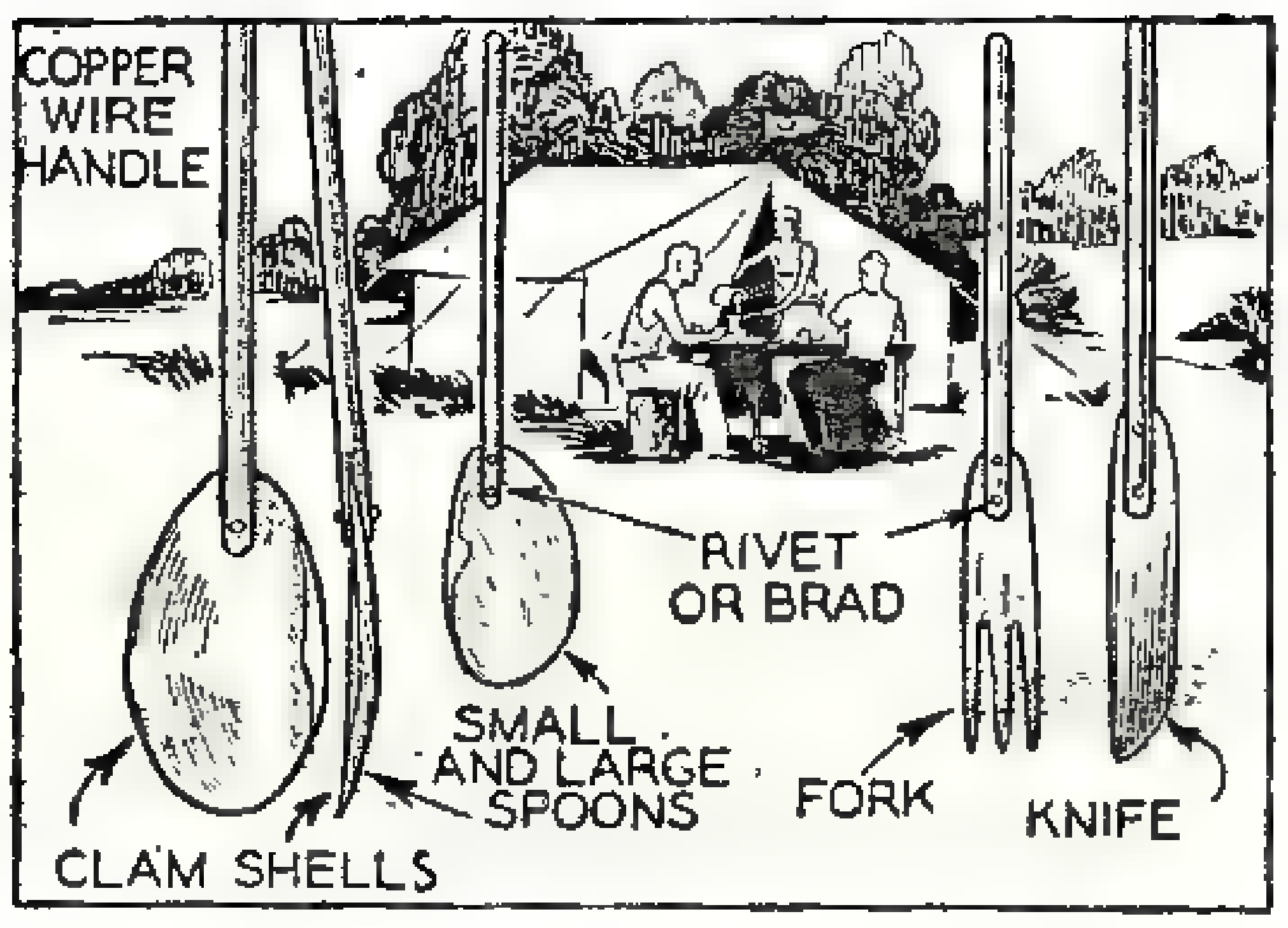
THIS brightly colored beach cabana makes a cool retreat from the sun for two or three persons. Sew together burlap to form a shelter 5' long by 4' deep by 4' high. Clean the sacks, then dye them either red or green with a strong aniline dye. Use saplings with sharpened ends for supports.—E. Van Horn.

Simple Wire Gadget Picks Up Golf Balls

THIS little gadget can be twisted together out of scrap wire in a minute. With it you can recover golf balls from gopher holes, pick up articles dropped in wells, or even recover corks which have been pushed into bottles. It may be necessary to slip a heavy nut above the prongs to give added weight. Adjust prongs to size of object being recovered.—E. Felsfar.



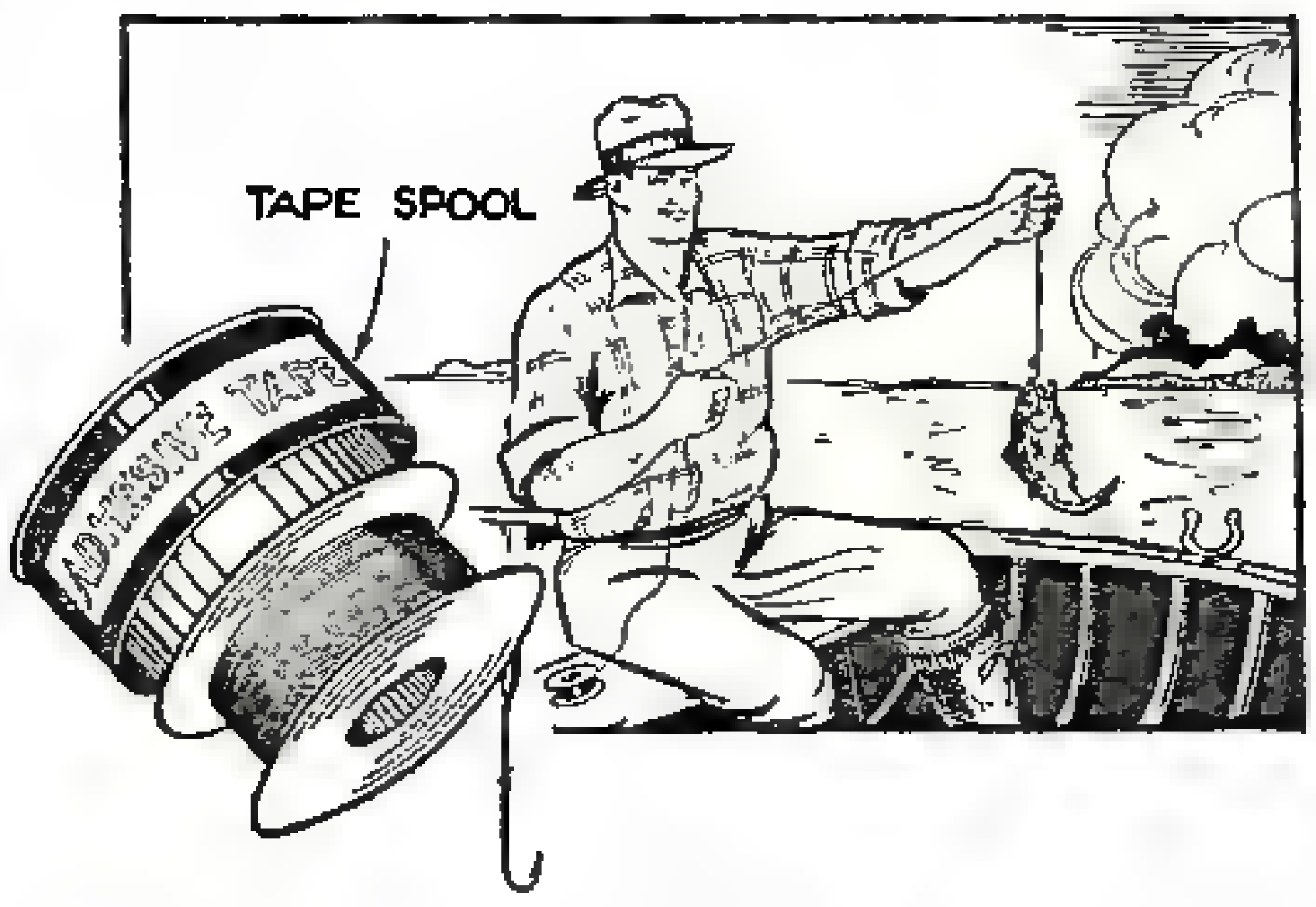
Uses for Clamshells



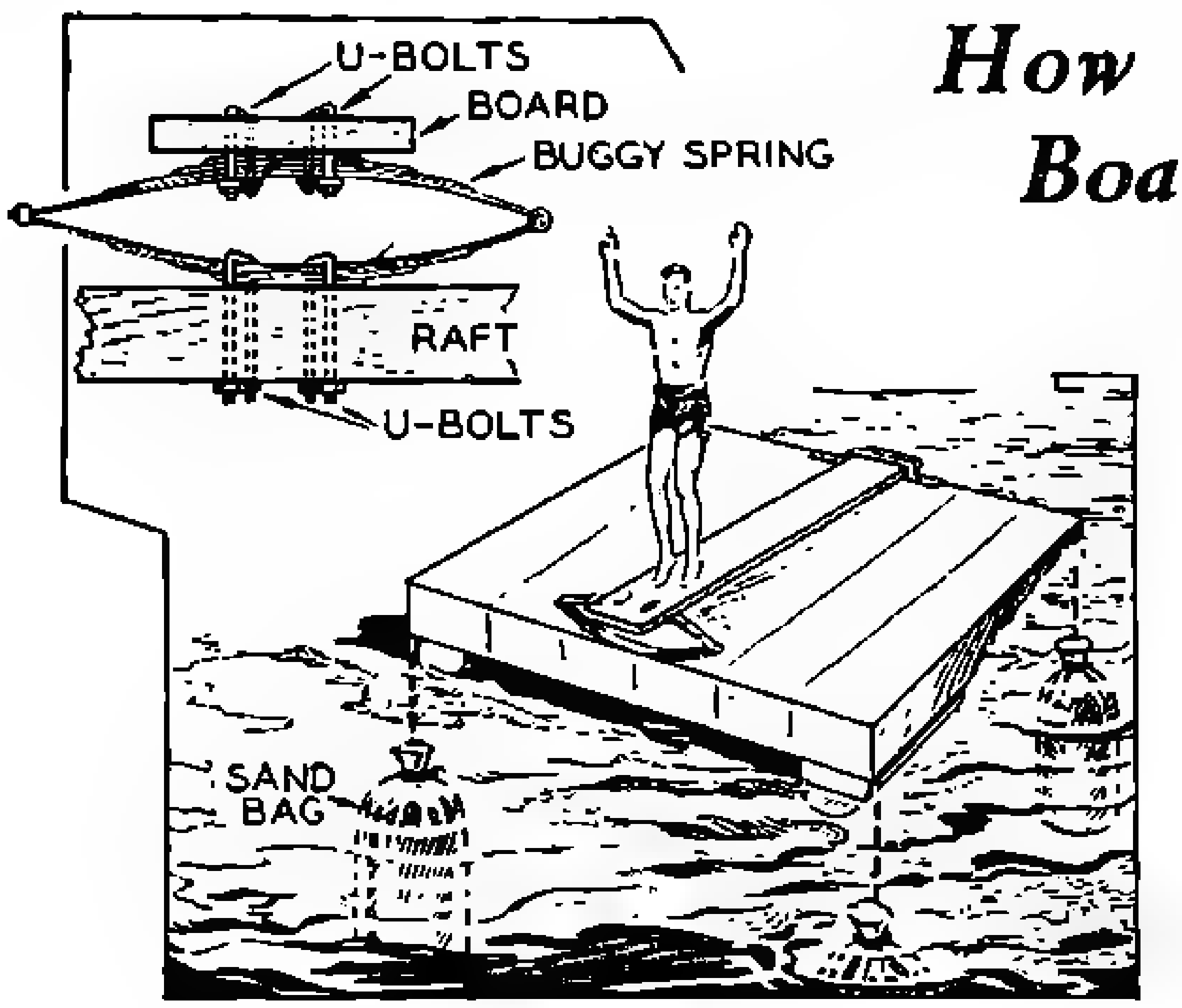
EXCELLENT spoons, knives, and forks can be made out of clamshells. Scour the backs with pumice stone, and polish the pearl-like inside lining. Drill small holes through each shell, and rivet on wood or copper wire handles. Grind the forks and knives down on an emery wheel, and saw out the tines with a hacksaw. Clamshell cutlery is ideal for camp.—G. E. Vance.

Tape Spool Makes a Good Fish Line Holder

TO ELIMINATE tangled lines in your tackle box, and to carry fish lines in your pocket without getting the hooks caught, wind your line on an empty adhesive tape spool. The metal shield which comes with the spool keeps the hook in a safe position.—O. E. Olson.



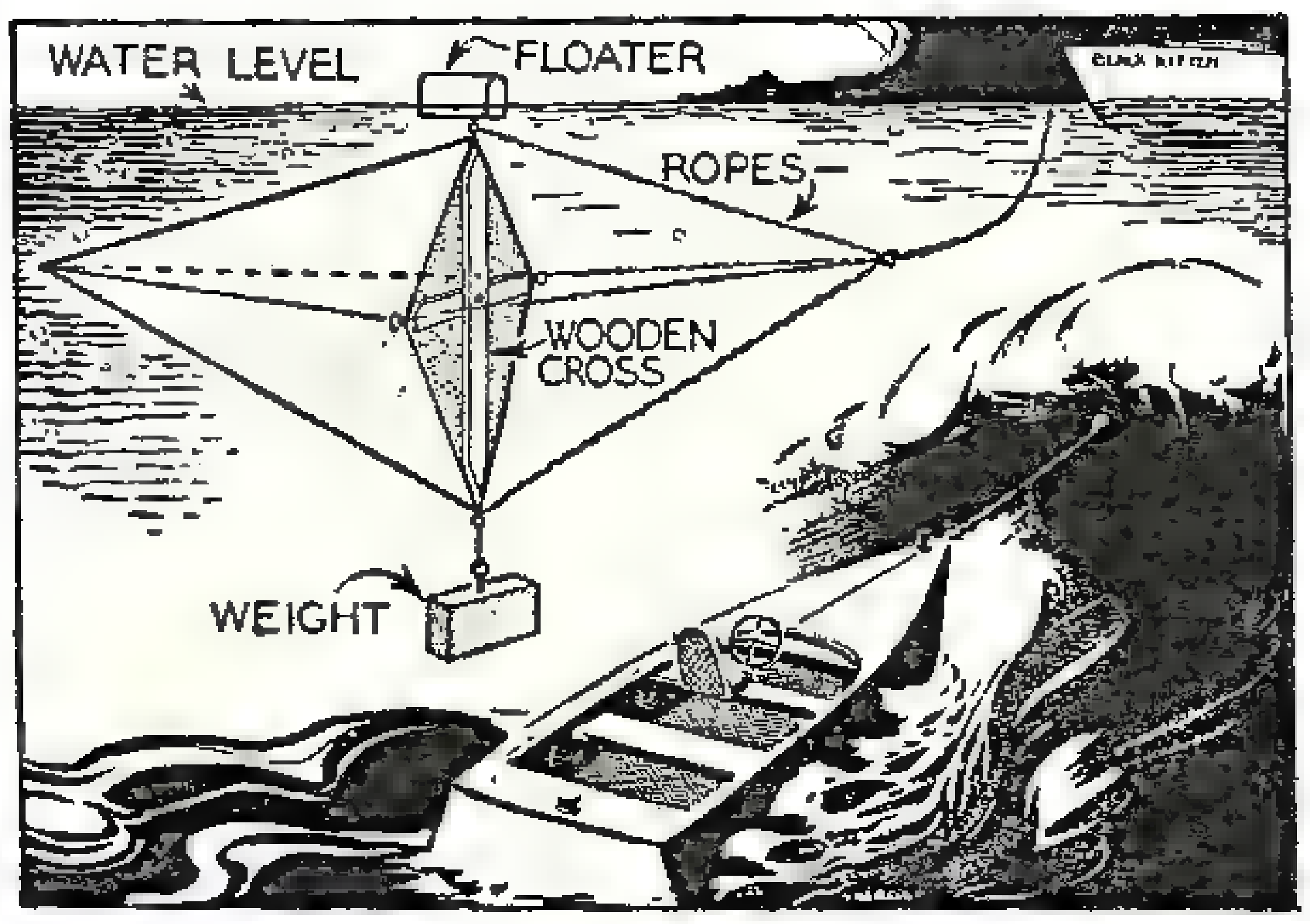
How to Make a Diving Board for the Raft



OIL barrel diving floats have a tendency to bob up and down on the water in the slightest wind, and to almost tip over if a regular diving board is used on them. Four sacks filled with sand and tied to the corners of the platform about 3 feet below the surface will greatly increase their stability. If the raft still bobs about with the regular diving board, try mounting an old buggy spring on one edge of the board and fastening any wide board across the raft from the spring to the opposite edge.—George Scullin.

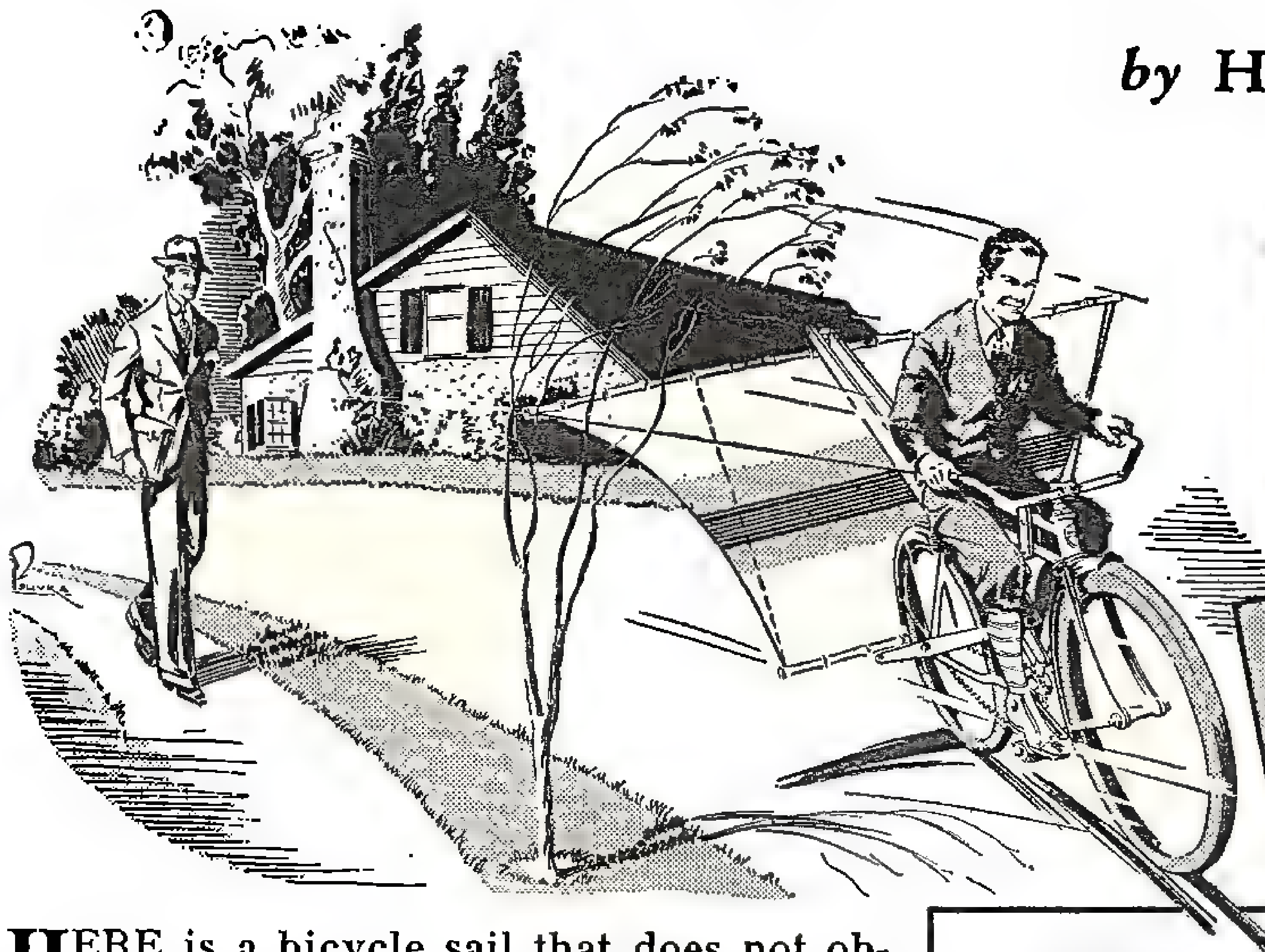
Driftanker Keeps Boats Facing Into Wind

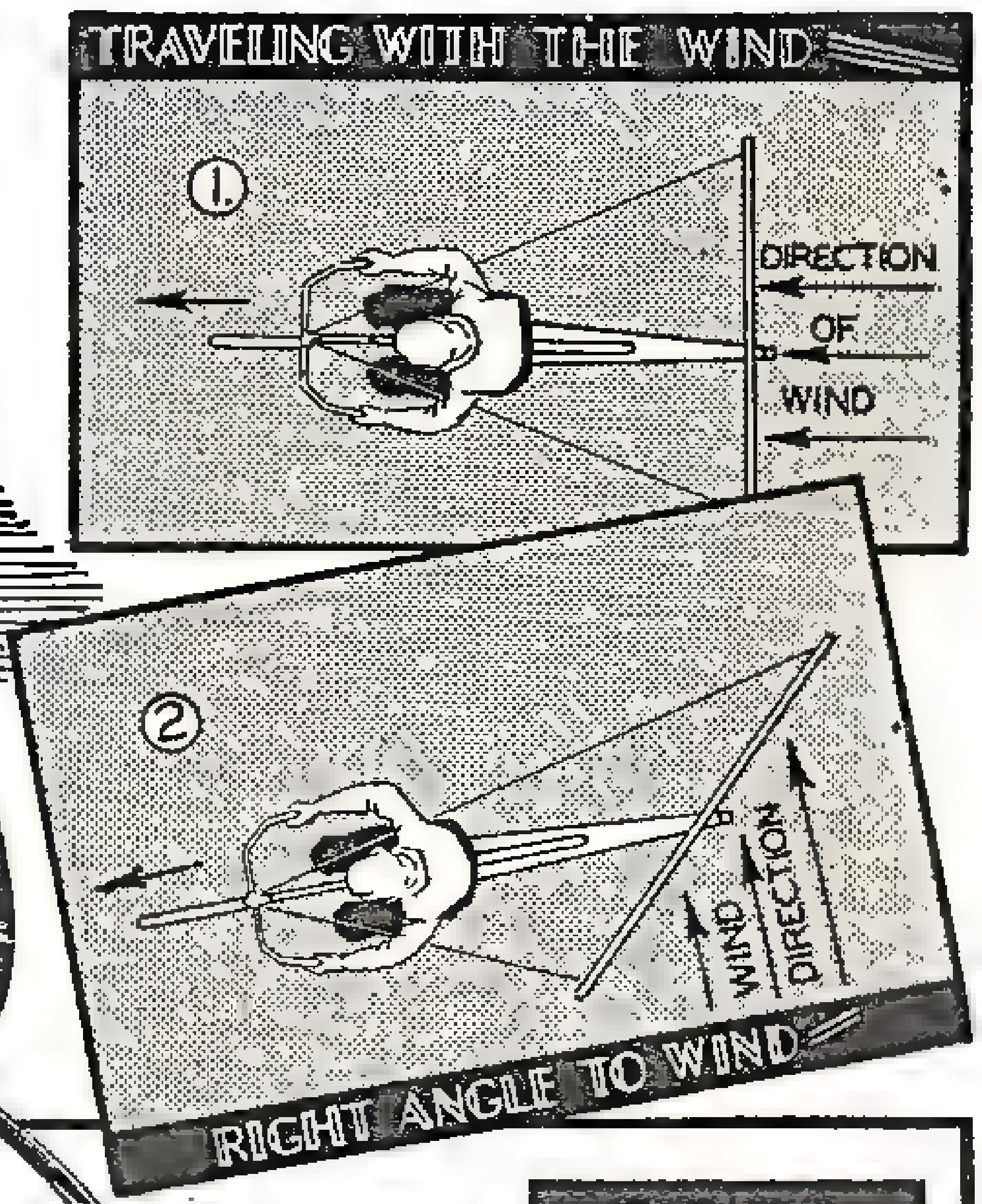
A FLOATING anchor will keep a drifting, disabled boat facing into the wind. Small boats navigating larger bodies of water need driftankers just as much as do freighters or steamers. The conical canvas bag, with an opening 2 to 3 feet in diameter, should be well sewed to stand the strain. Wooden sticks may be used to spread the opening. Bag is kept floating on one corner with the aid of a buoy or lifesaver, and weighted down at the opposite end.—I. Kaho.

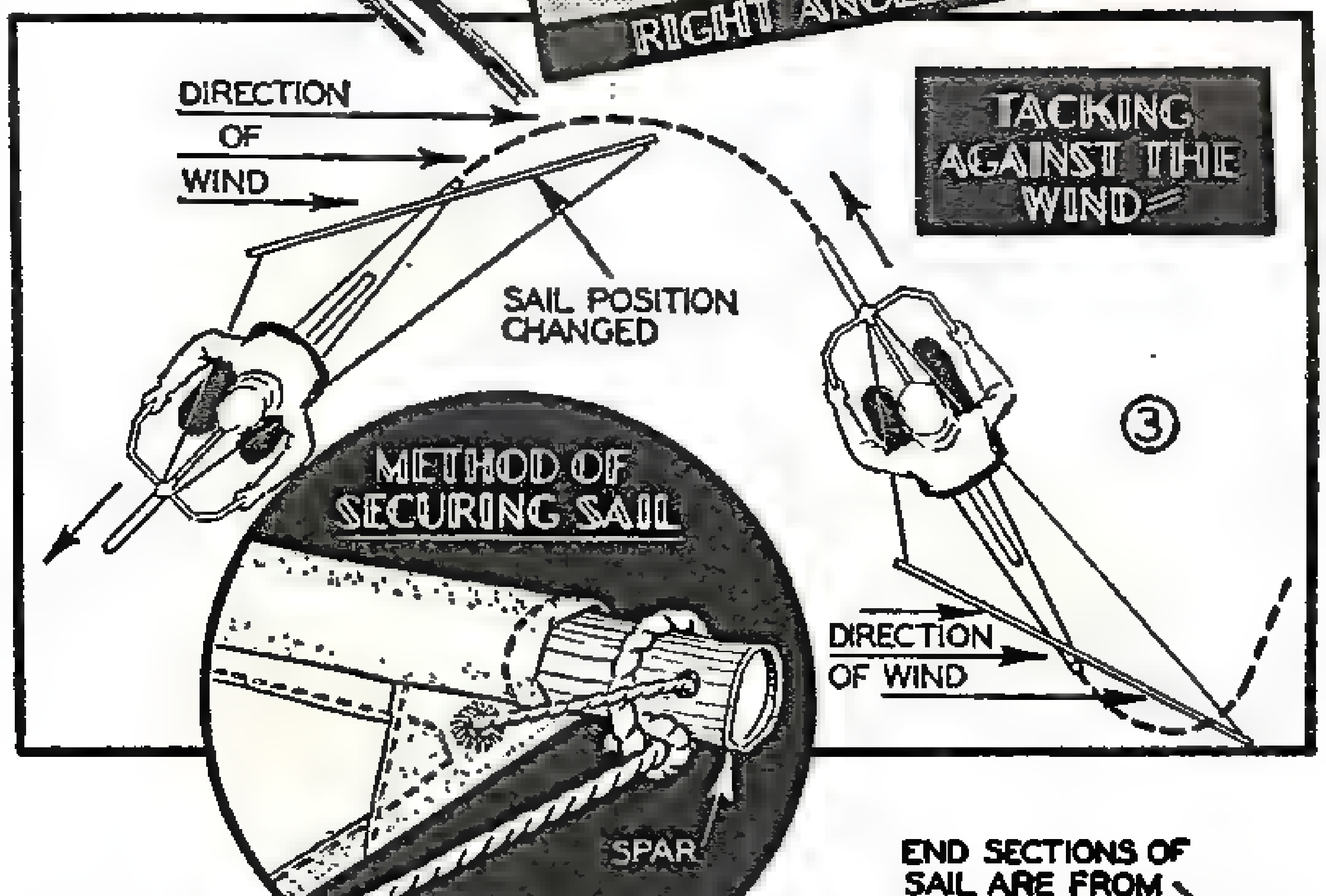


MOUNT This SAIL on YOUR BIKE and COAST along BEFORE the WIND

by HI SIBLEY

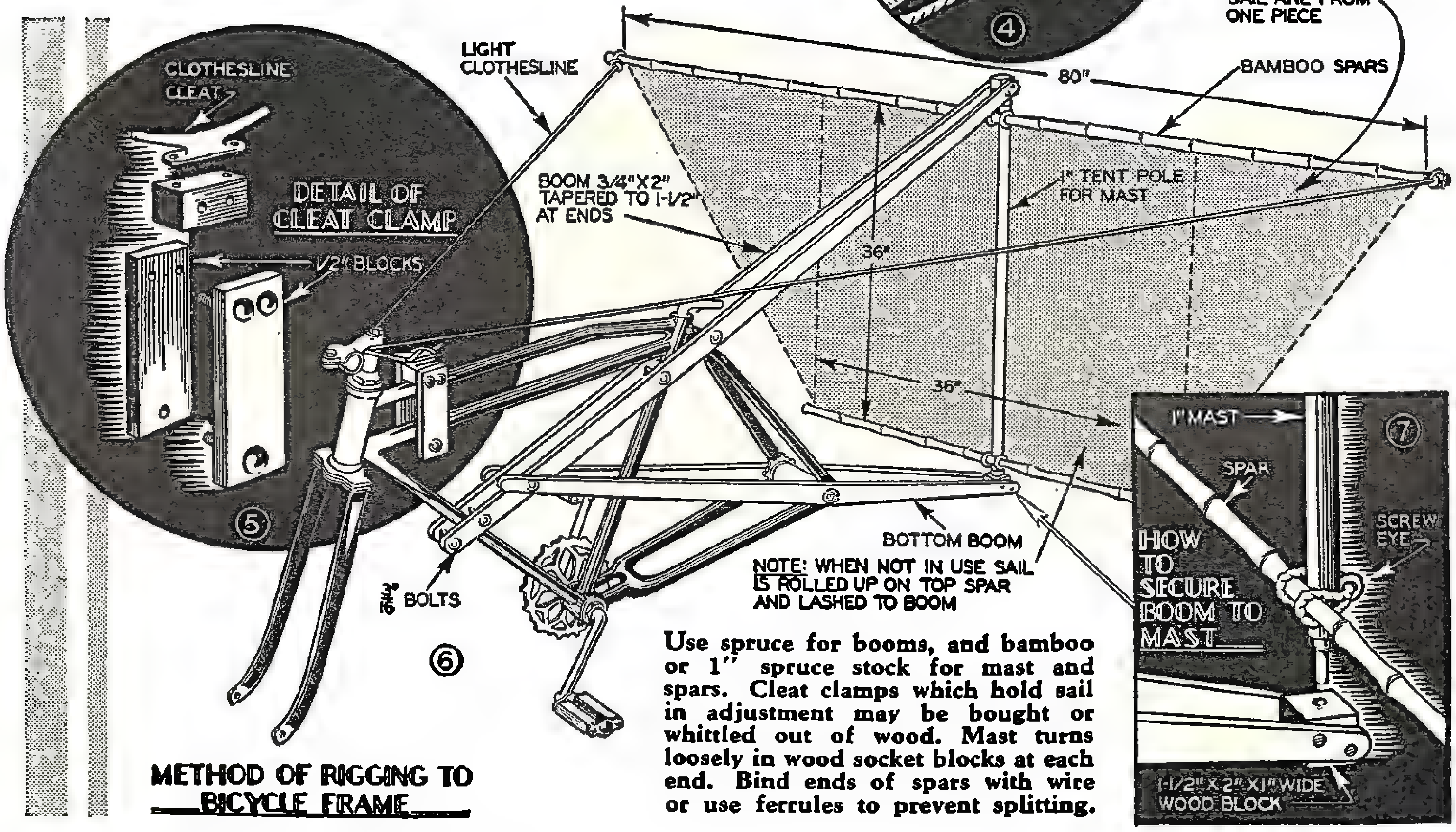



TRAVELING WITH THE WIND
①
DIRECTION OF WIND
②
WIND DIRECTION
RIGHT ANGLE TO WIND


TACKING AGAINST THE WIND
DIRECTION OF WIND
SAIL POSITION CHANGED
③
DIRECTION OF WIND
METHOD OF SECURING SAIL
SPAR
④

HERE is a bicycle sail that does not obstruct the rider's view, and still has a generous spread of canvas. It maneuvers exactly like a sailboat, and is not likely to capsize the rider even in a strong wind.

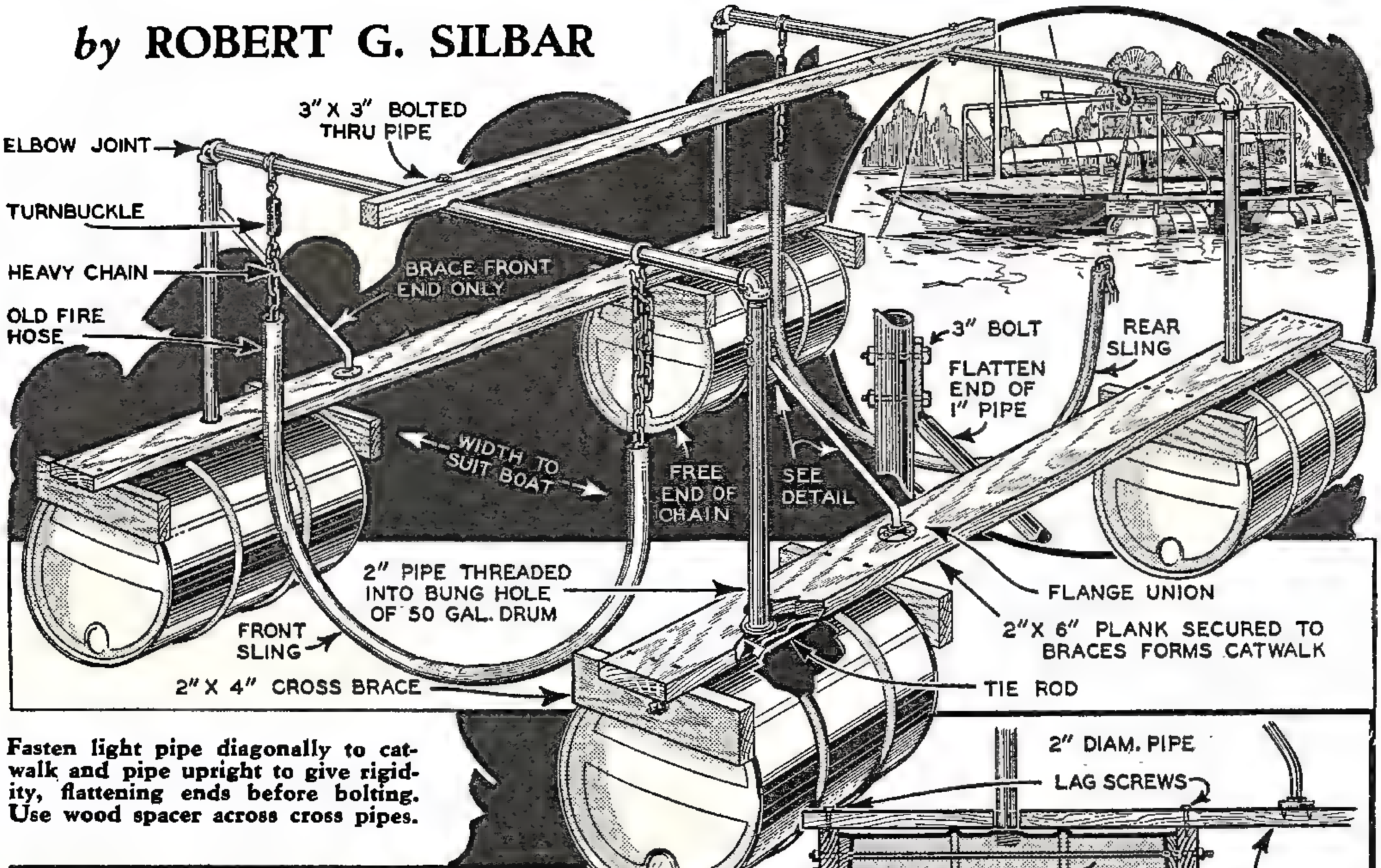
A good quality muslin or regular tent canvas may be used for the sail. Sew all edges, leaving a hem at top and bottom large enough for the spars. Holes are cut in the hem at the center for the ropes which bind the spars to the mast. Eyelets for the guy ropes are fastened in each corner of the sail.


END SECTIONS OF SAIL ARE FROM ONE PIECE
LIGHT CLOTHESLINE
80"
BAMBOO SPARS
CLOTHESLINE CLEAT
DETAIL OF CLEAT CLAMP
1/2" BLOCKS
⑤
BOOM 3/4"X2" TAPERED TO 1-1/2" AT ENDS
1" TENT POLE FOR MAST
36"
36"
BOTTOM BOOM
NOTE: WHEN NOT IN USE SAIL IS ROLLED UP ON TOP SPAR AND LASHED TO BOOM
3/16" BOLTS
⑥
METHOD OF RIGGING TO BICYCLE FRAME
1" MAST
SPAR
⑦
SCREW EYE
HOW TO SECURE BOOM TO MAST
1-1/2" X 2" X 1" WIDE WOOD BLOCK

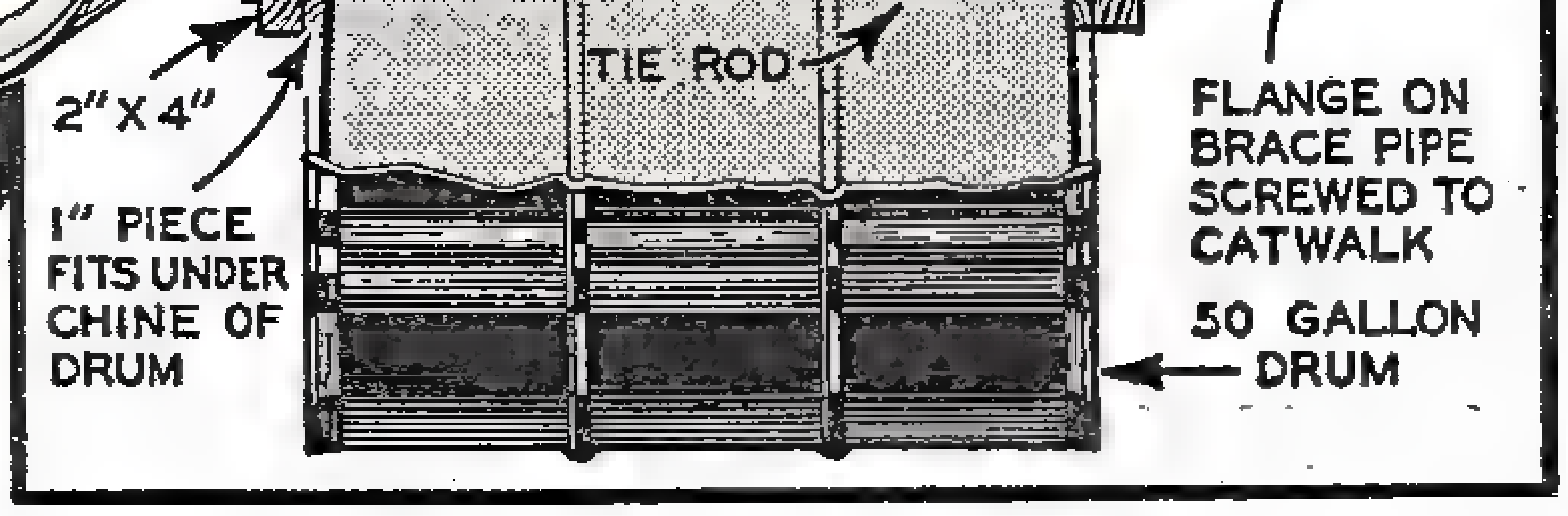
Use spruce for booms, and bamboo or 1" spruce stock for mast and spars. Cleat clamps which hold sail in adjustment may be bought or whittled out of wood. Mast turns loosely in wood socket blocks at each end. Bind ends of spars with wire or use ferrules to prevent splitting.

Floating Drydock EASILY Raises Boats

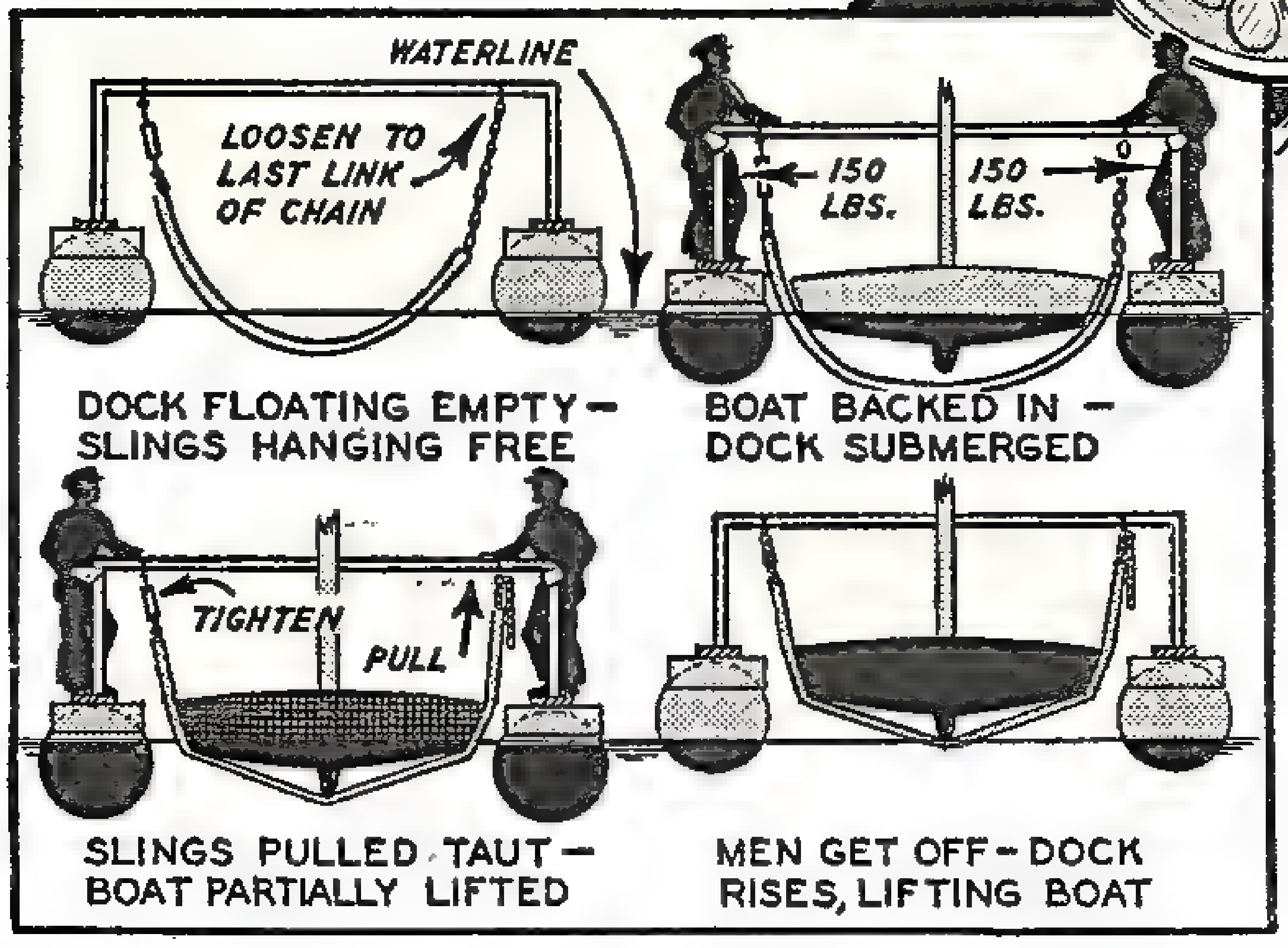
by ROBERT G. SILBAR


3" X 3" BOLTED THRU PIPE
ELBOW JOINT
TURNBUCKLE
HEAVY CHAIN
OLD FIRE HOSE
BRACE FRONT END ONLY
WIDTH TO SUIT BOAT
FREE END OF CHAIN
SEE DETAIL
3" BOLT
FLATTEN END OF 1" PIPE
REAR SLING
2" PIPE THREADED INTO BUNG HOLE OF 50 GAL. DRUM
FRONT SLING
FLANGE UNION
2"X 6" PLANK SECURED TO BRACES FORMS CATWALK
2" X 4" CROSS BRACE
TIE ROD

Fasten light pipe diagonally to catwalk and pipe upright to give rigidity, flattening ends before bolting. Use wood spacer across cross pipes.


2" DIAM. PIPE
LAG SCREWS
TIE ROD
2"X4"
1" PIECE FITS UNDER CHINE OF DRUM
FLANGE ON BRACE PIPE SCREWED TO CATWALK
50 GALLON DRUM

Use tie rods on each side of 50-gallon drum to hold in place.


WATERLINE
LOOSEN TO LAST LINK OF CHAIN
DOCK FLOATING EMPTY— SLINGS HANGING FREE
150 LBS.
150 LBS.
BOAT BACKED IN — DOCK SUBMERGED
TIGHTEN
PULL
SLINGS PULLED TAUT— BOAT PARTIALLY LIFTED
MEN GET OFF—DOCK RISES, LIFTING BOAT

Sketches show how floating dock lifts boat. Men standing on catwalk and pulling up on chains depress floats. When they step off, the dock rises, lifting boat clear of water.

"DRYING OUT" a sailboat before a race is a practice followed in professional circles which the amateur seldom takes into consideration. A sailboat left in the water for any length of time absorbs water, no matter what type of paint or finish is used on the hull.

Where regular dry-docking facilities are not to be had, a floating dry-dock easily made out of scrap parts will prove valuable.

Use four 50 gallon oil drums for the floats. Screw two U-shaped cross members made up of two inch pipe into the bungs of the drums, making the arch high enough to clear the sail boom of your boat. Bolt 2"x6" planks along both sides of the dock for the catwalk. The sailboat is backed slowly under the frames and over slings made of heavy chain covered with old fire hose. Once the boat is in position the slings are pulled taut and fastened to the U-frames. The slings are slipped under the boat simply by standing on the drydock.

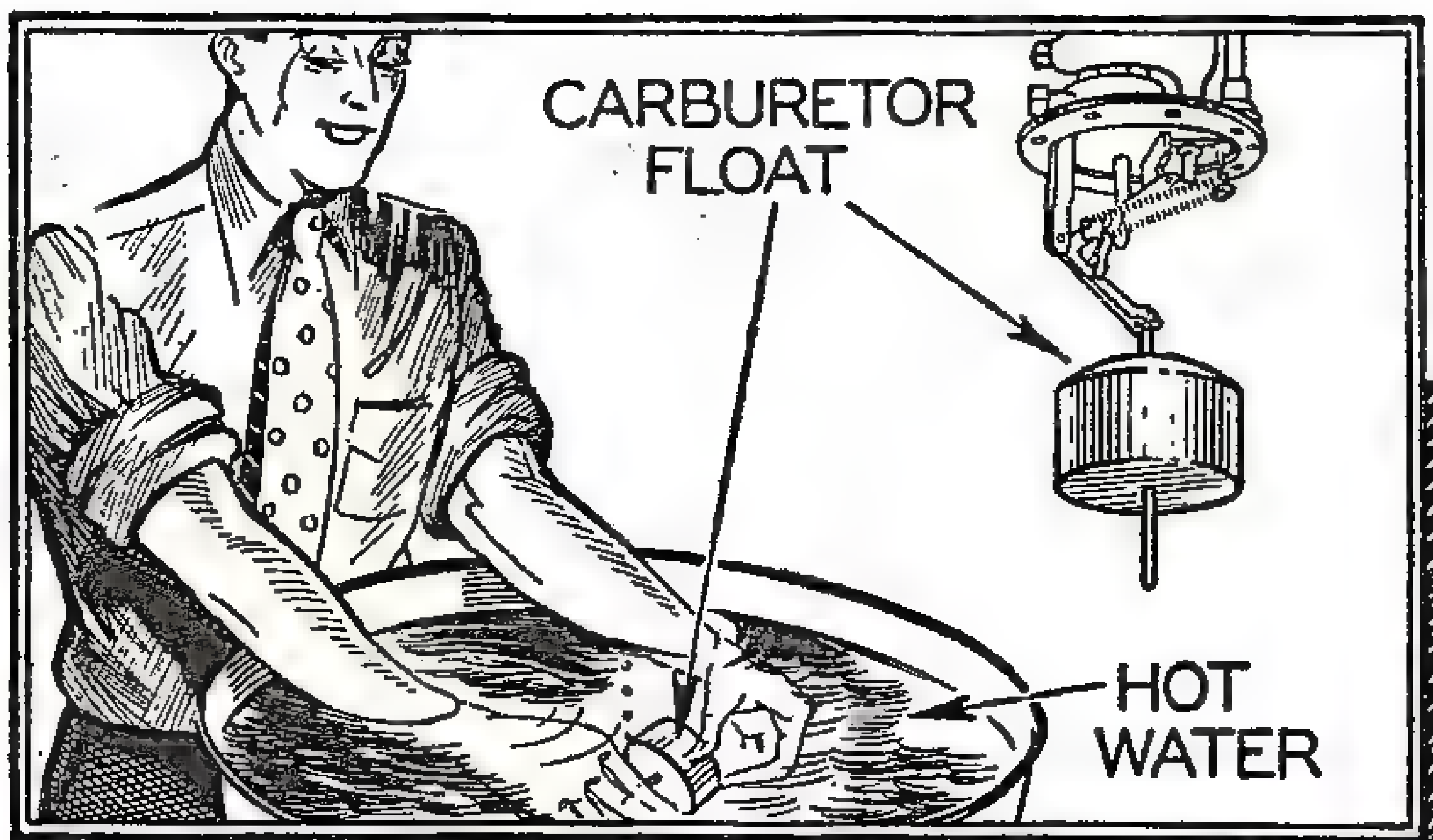
The buoyancy of the floats is almost enough to lift the boat. The weight of the dock, subtracted from the weight of water displaced by the floats when they are depressed, is equal to the weight of boat which can be lifted.

Pulling the slings taut by men standing on the catwalk lowers the drums still more into the water. When the men step off buoyancy will lift the boat clear of the water.

The sailboat should hang two inches above the water surface for 24 hours preceding a race. It will then be much faster, because water drag will be lessened.

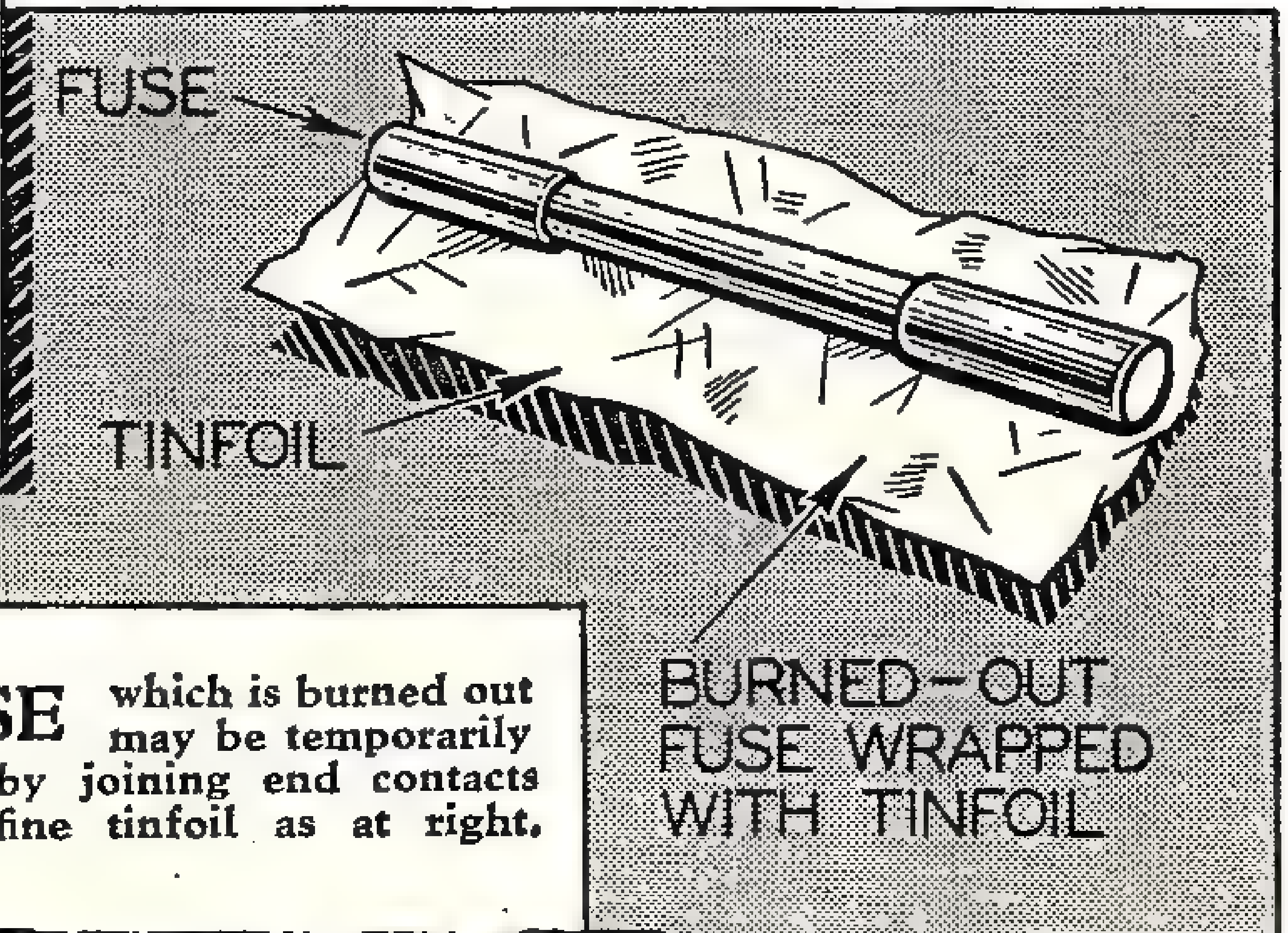
A light set of tackle can be used to lift the boat higher. The tackle depresses the floats even deeper in the water as the ropes attached to the slings are pulled. Release of the men's weights will lift the sailboat just that much higher.

Useful Hints for the Auto Owner

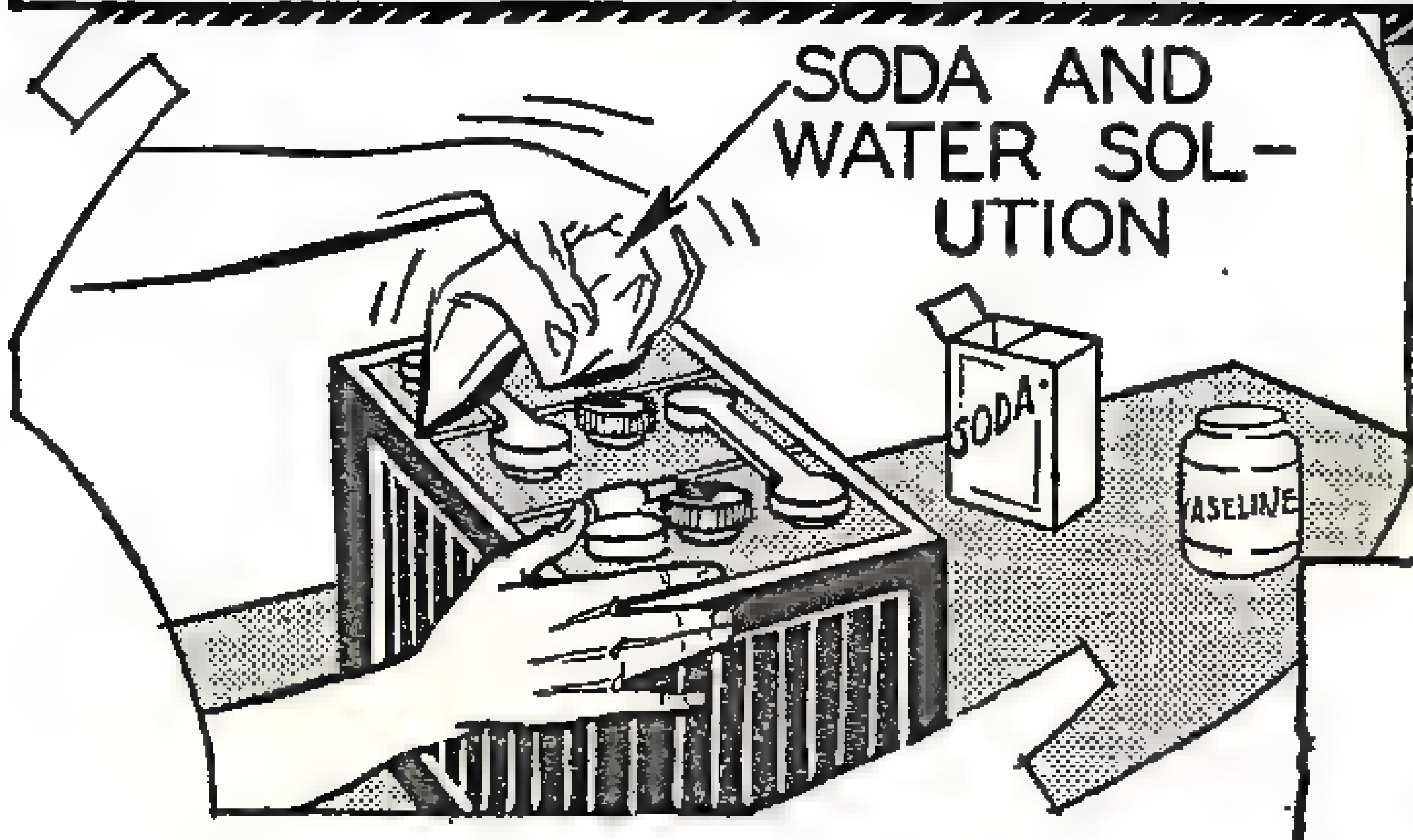

CARBURETOR FLOAT
HOT WATER

CARBURETOR FLOAT LEAKS

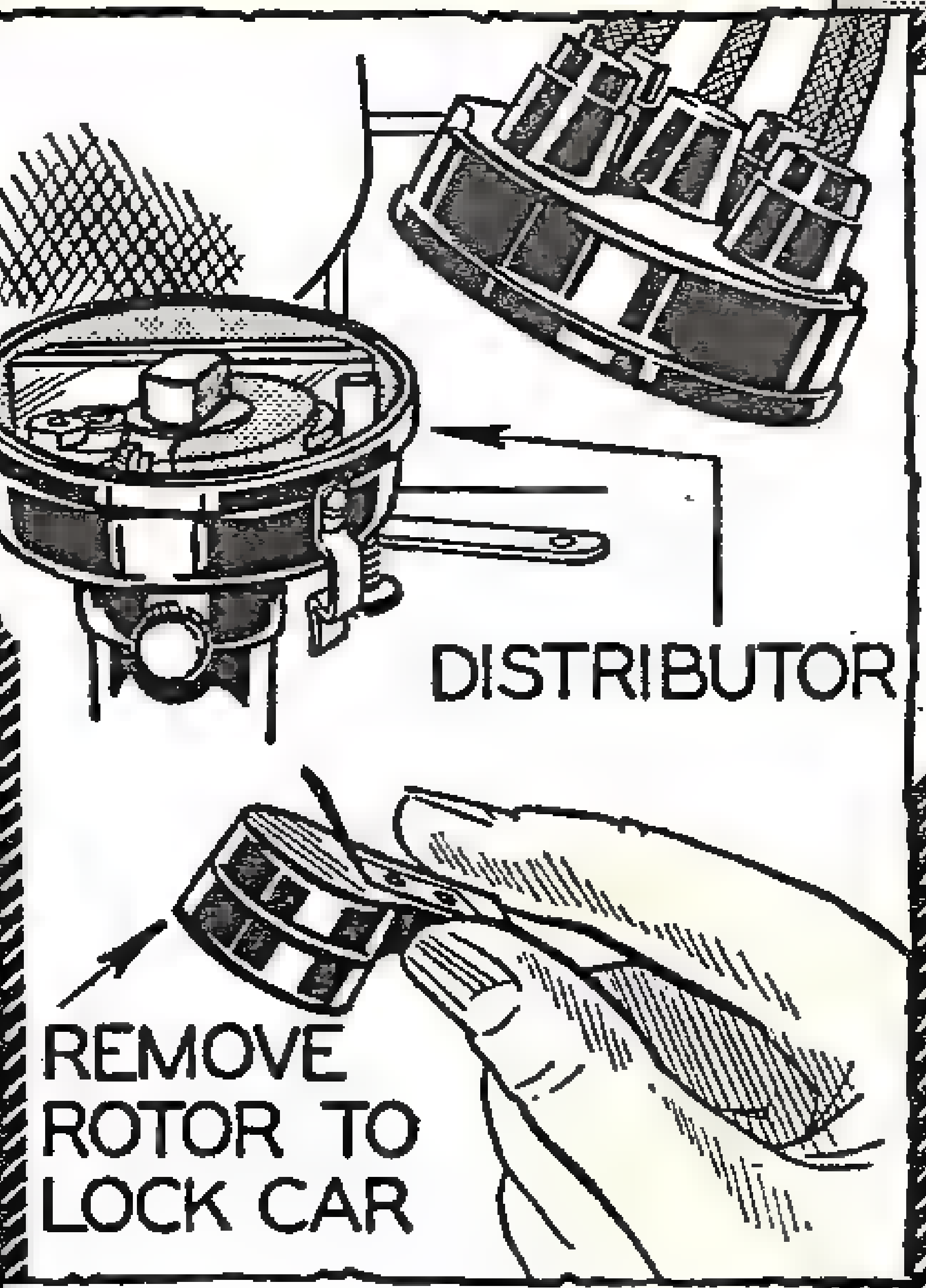
can easily be located by removing float and placing in dish of hot water. Note where bubbles appear, remove float immediately, and seal up holes with solder. If considerable water or gasoline has entered, dry out float in oven to drive out moisture before soldering.


FUSE
TINFOIL
BURNED-OUT FUSE WRAPPED WITH TINFOIL

FUSE which is burned out may be temporarily used by joining end contacts with fine tinfoil as at right.

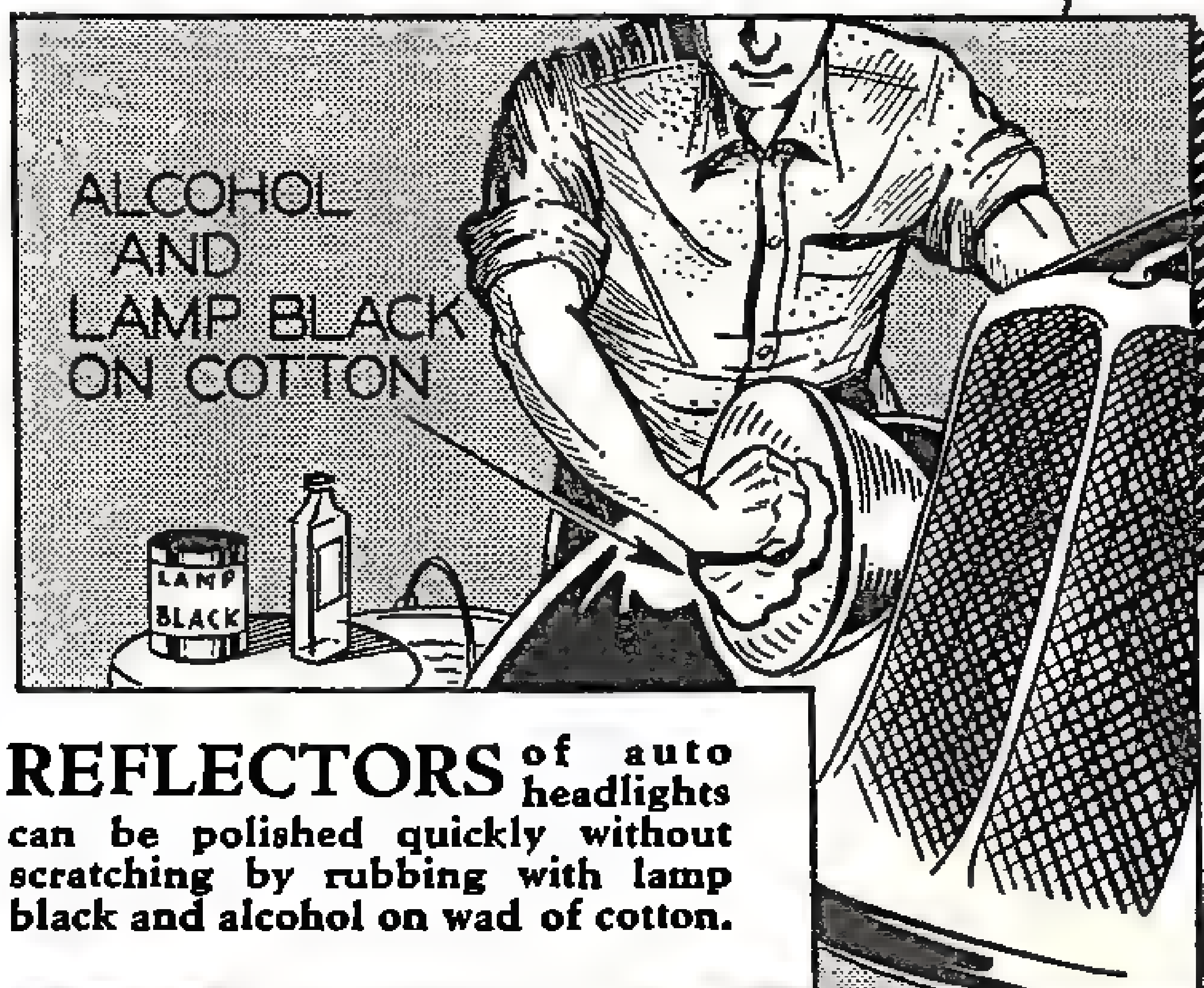

SODA AND WATER SOLUTION
SODA
VASELINE

CORROSION can easily be removed from storage battery terminals with rag dipped in solution of baking soda and water. When cleaned, a coating of vaseline will prevent further corrosion.

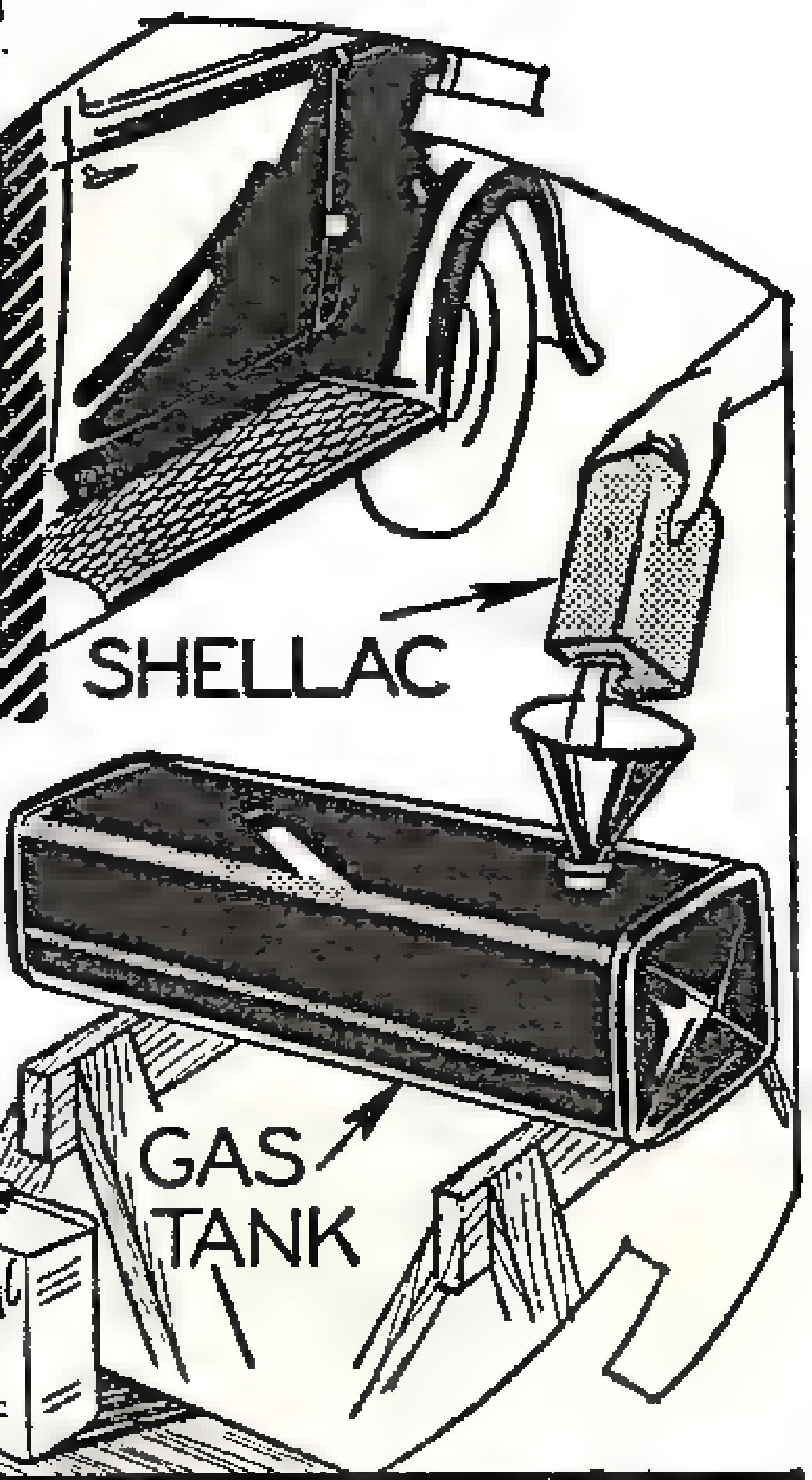

DISTRIBUTOR
REMOVE ROTOR TO LOCK CAR

LOCK CAR

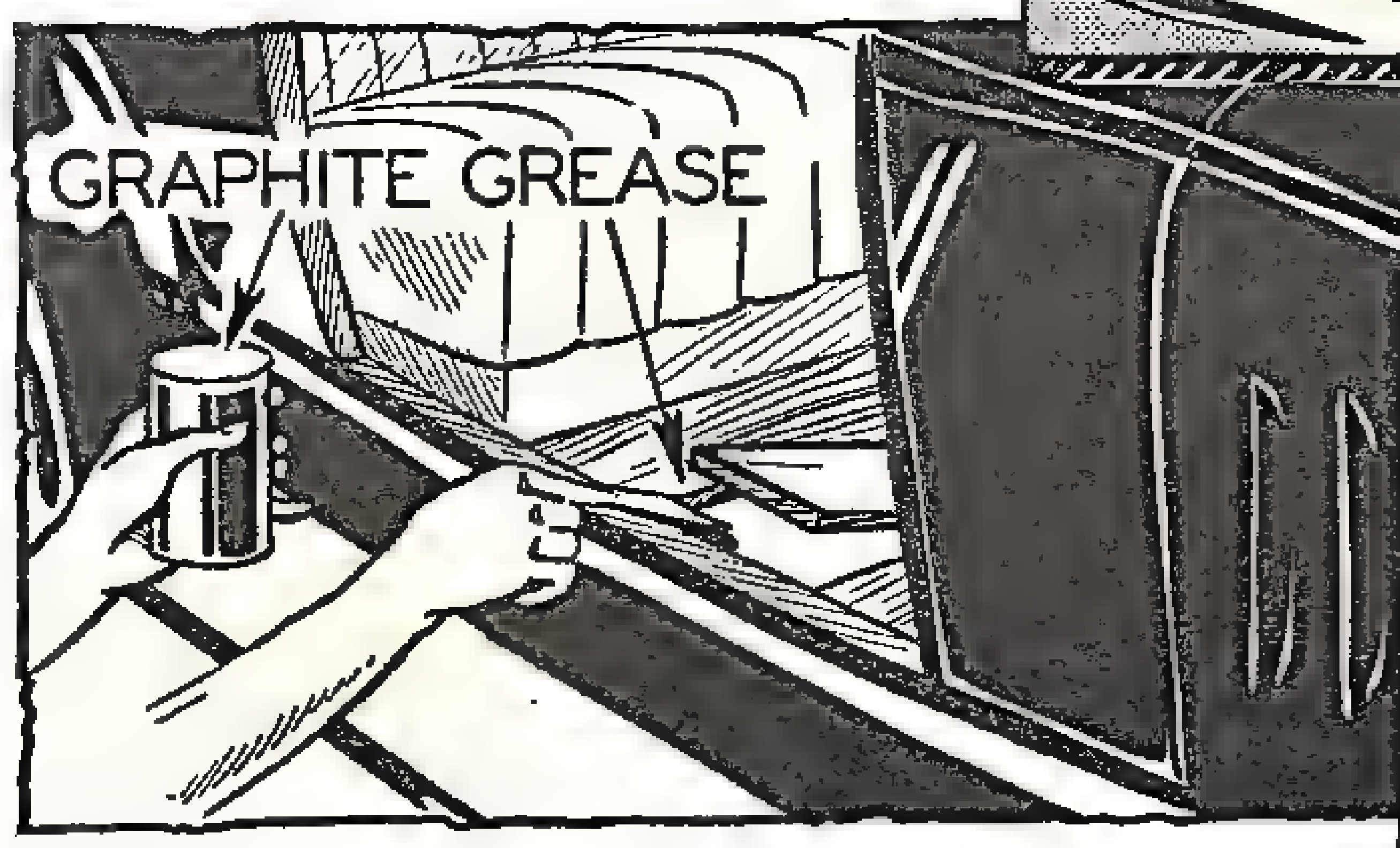
by removing rotor from distributor. Rather than lift up hood to locate trouble, auto thieves will move on to other cars. No one can start car until distributor is replaced.


ALCOHOL AND LAMP BLACK ON COTTON
LAMP BLACK

REFLECTORS of auto headlights can be polished quickly without scratching by rubbing with lamp black and alcohol on wad of cotton.

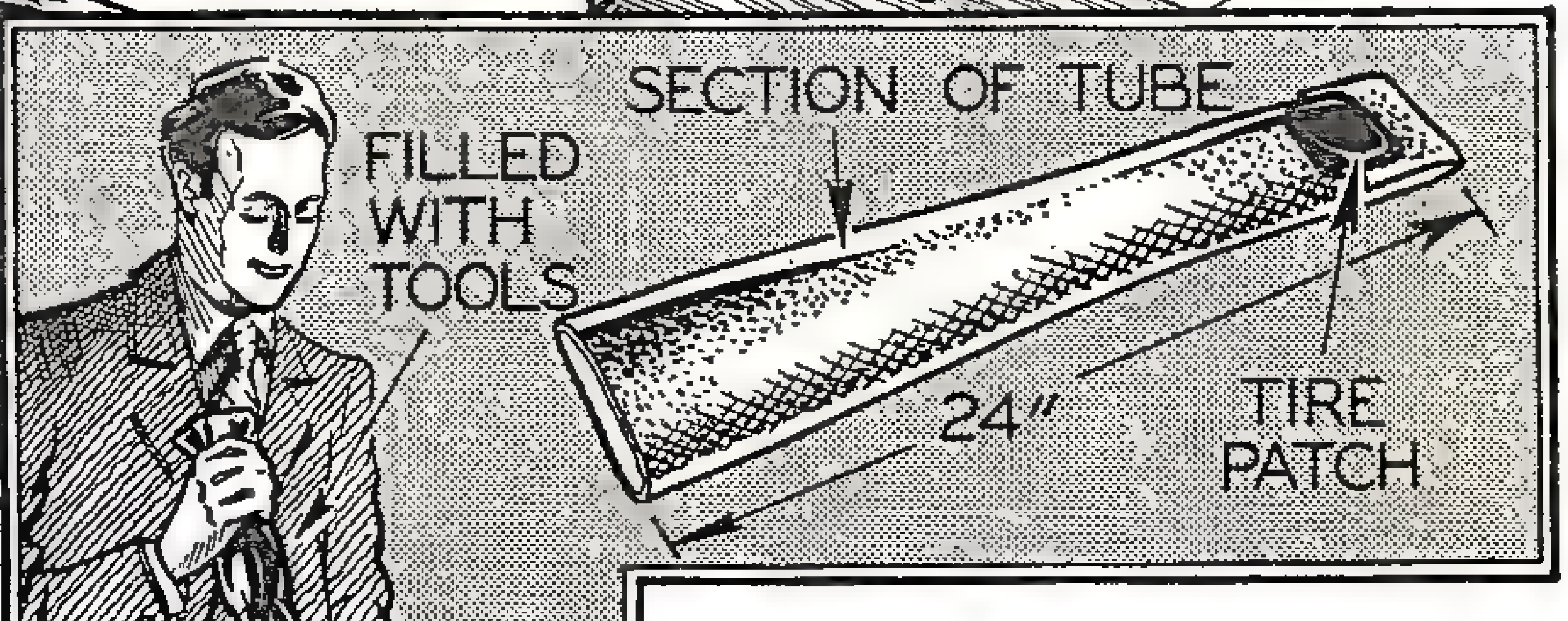

SHELLAC
GAS TANK
SHELLAC

LEAKS in gas tank are permanently repaired by first thoroughly drying out tank, then pouring in shellac. Swish shellac around into all corners, then drain and let dry.


GRAPHITE GREASE

FLOOR BOARD SQUEAKS

can be very annoying in any car. Lift up boards one at a time and paint ends with graphite grease. Paint side edges of boards and all parts of car in contact with the loose boards if squeaks persist. Graphite in grease will lubricate boards long after grease itself has penetrated into wood.


SECTION OF TUBE
FILLED WITH TOOLS
24″
TIRE PATCH

INNER TUBE section two feet long makes handy emergency water bucket which can also be used as container for spare parts. Seal end of tube with tube patches to make bag waterproof.

A COLONIAL

with Adjustable

by O. E. OLSON

THERE are very few of us who do not appreciate the beauty of colonial furniture, especially where design and use are in harmony with present conventions. In the simple and graceful lines of this lamp some of the spirit of Early America is recaptured. The soft and mellow tone of hard maple lends the final touch keeping it distinctly colonial.

Select clear seasoned hard maple from 3"x3"x33" stock to make the lamp post. Split the stock and saw a ½"x¼" groove down the center of each piece. Glue these pieces together in their original position and clamp well. This method of making the hole for the light cord is much more accurate than boring, and saves a great deal of time.

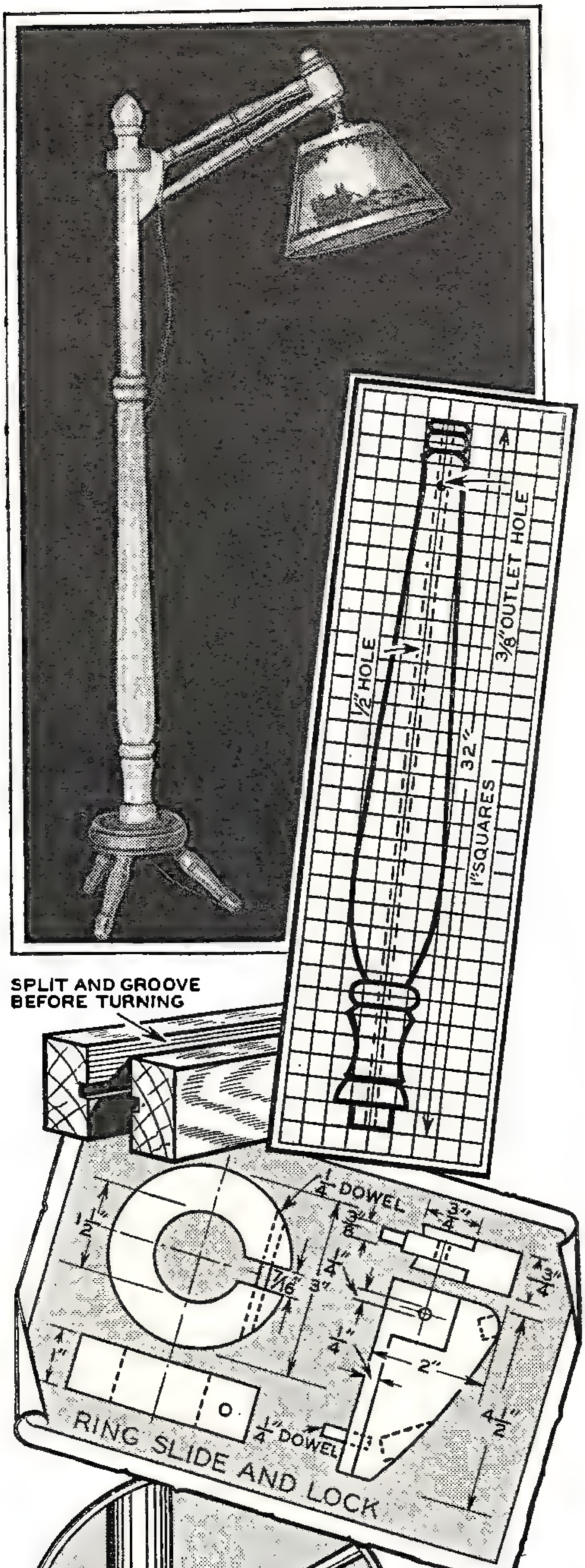
Use Linseed Oil Finish

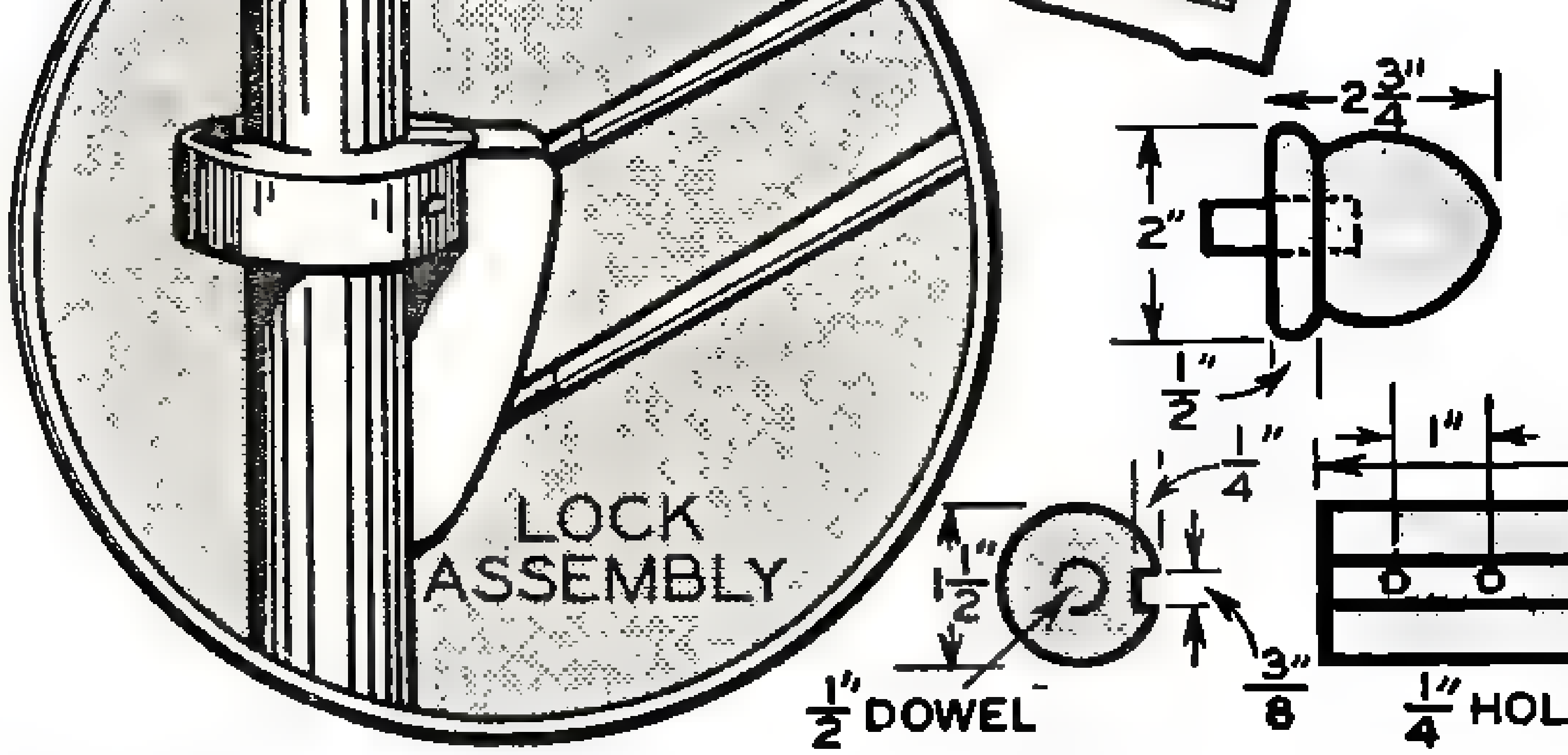
When the glue is thoroughly dry set the stock in a large wood-turning lathe and turn to shape. Sand, finish and polish the work before removing it from the lathe. The type of finish may be either French polish or linseed oil with rubbed wax.

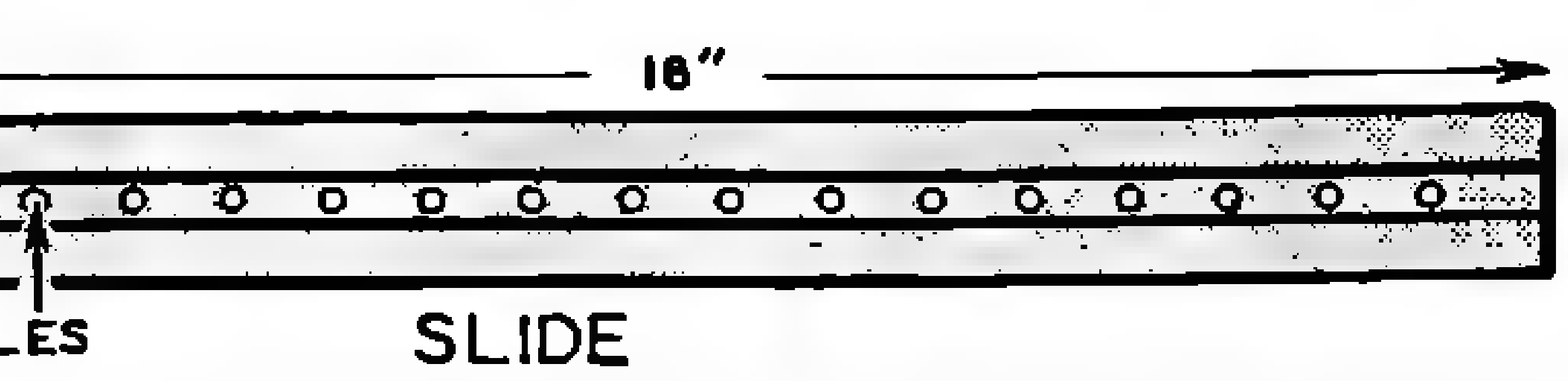
The lamp support is made to slide freely up or down, locking in place at any desired height. Turn the upper post or slide to a scant 1½" in diameter. Cut the ring lock channel on the circle saw. If this machine is not available cut as you would in making a mortise. Bore the ¼" lock holes 1" apart taking care that they are in the middle of the channel. Bore ½" dowel holes in both ends of the post.

In making the ring and lock follow all specifications closely to insure an easily adjusted and well fitting lock. When the lamp arms are raised the ring should slide freely with a minimum of play. A slight rounding of some of the inside corners may be necessary to give smooth action.

The arms are turned from 1"x1" stock to an end dimension of ½". The lower arm is somewhat longer and more difficult to place due to the necessity of boring holes at an angle in the lock







Completed bridge lamp shown at upper left. Lamp support arms are fastened to lock assembly which slides up and down on center post, locking in place at any desired height. Any kind of parchment or silk shade may be used on lamp.

Bridge Lamp

Shade Support

piece. Determine carefully the angle needed before boring.

Turn the decorative top for the post and the lamp socket block from one piece and separate with the parting tool. Bore holes as shown in the diagrams, using a ⅜" bit for all wire outlet holes.

The top of the cricket stool, which forms the base of the lamp, is turned from 1½" stock. Cut the center post hole on the lathe to a snug fit with lamp post, thereby insuring a perfectly vertical post assembly.

Cut a template or turning pattern for the legs out of heavy cardboard. Turn three legs out of 2"x2" stock. Draw them up well to the template for uniformity. Locate and mark positions for the leg holes in the stool top, the legs being equal distances apart. This is simply done by constructing an equilateral triangle on the stool base, each corner thus marking a hole.

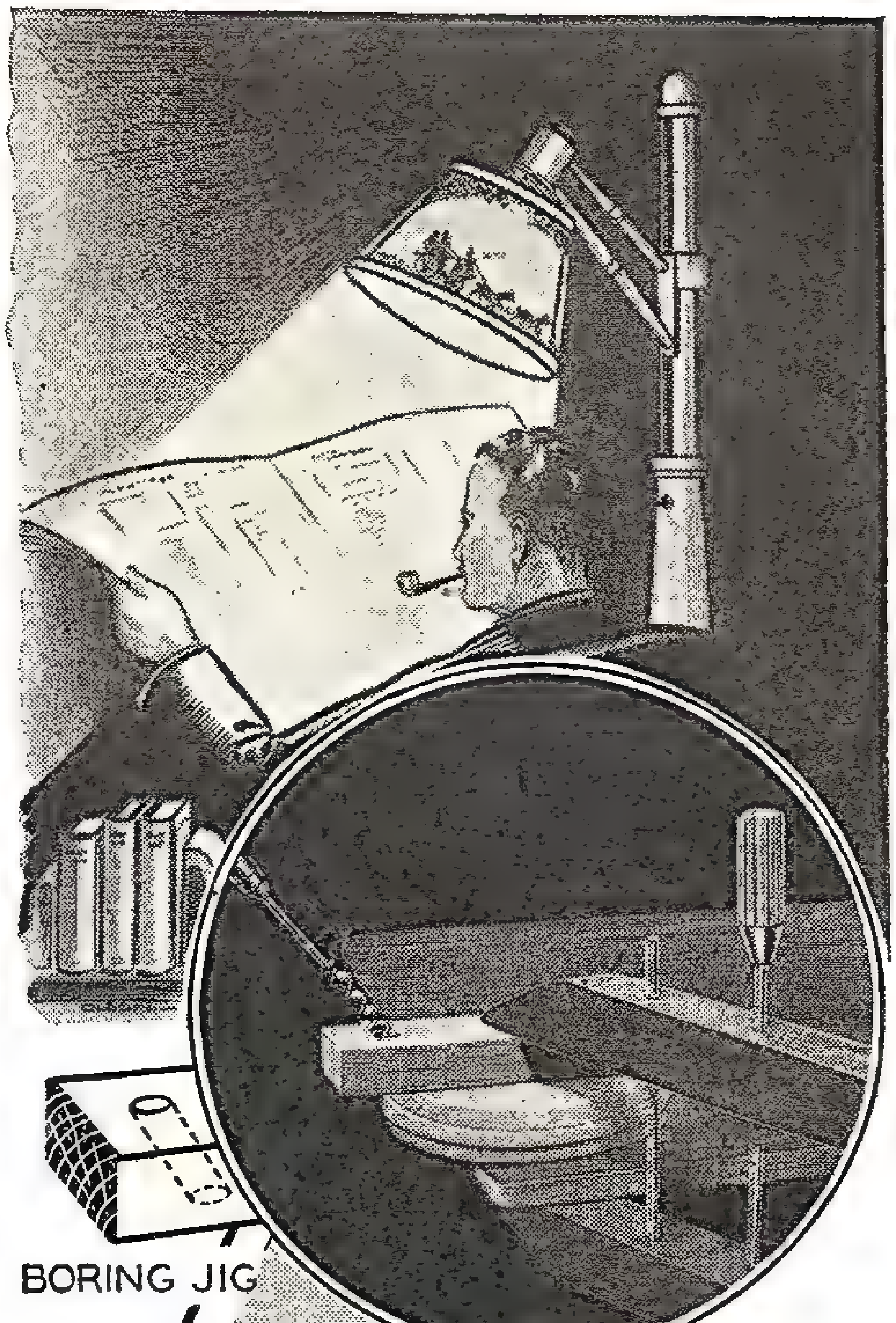
Drilling the Leg Holes

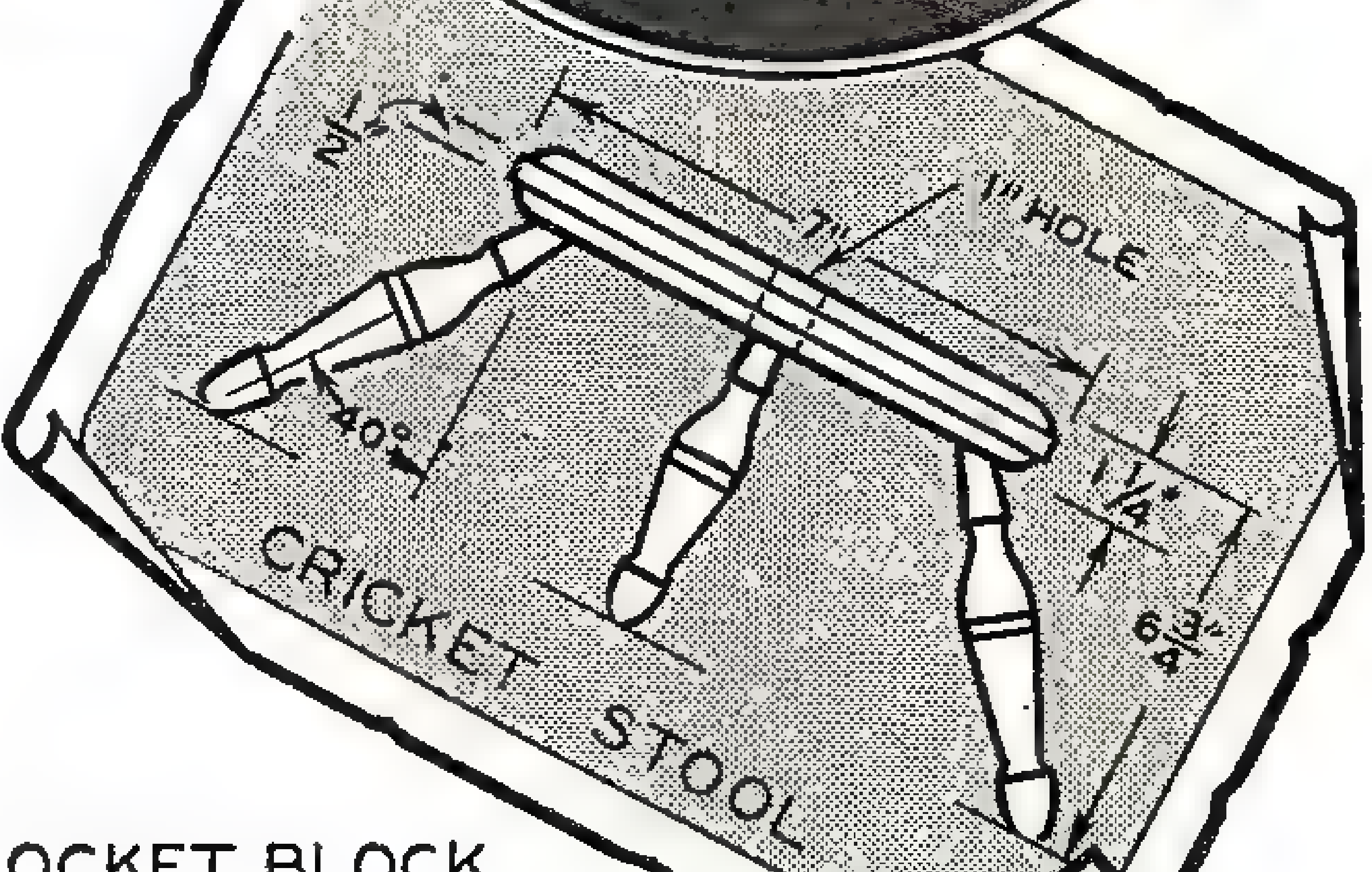
It is very difficult to bore all leg holes at a uniform angle without a drill press. If such a machine is not available it can be done by making a boring jig from 2" scrap wood stock. Bore a ¾" hole at an angle of forty degrees in this stock. Clamp the guide securely to the cricket stool top over the leg hole position. The hole in the scrap stock will guide the drill for the leg hole. Bore all of the leg holes in this manner. Glue in the legs securely and test for levelness.

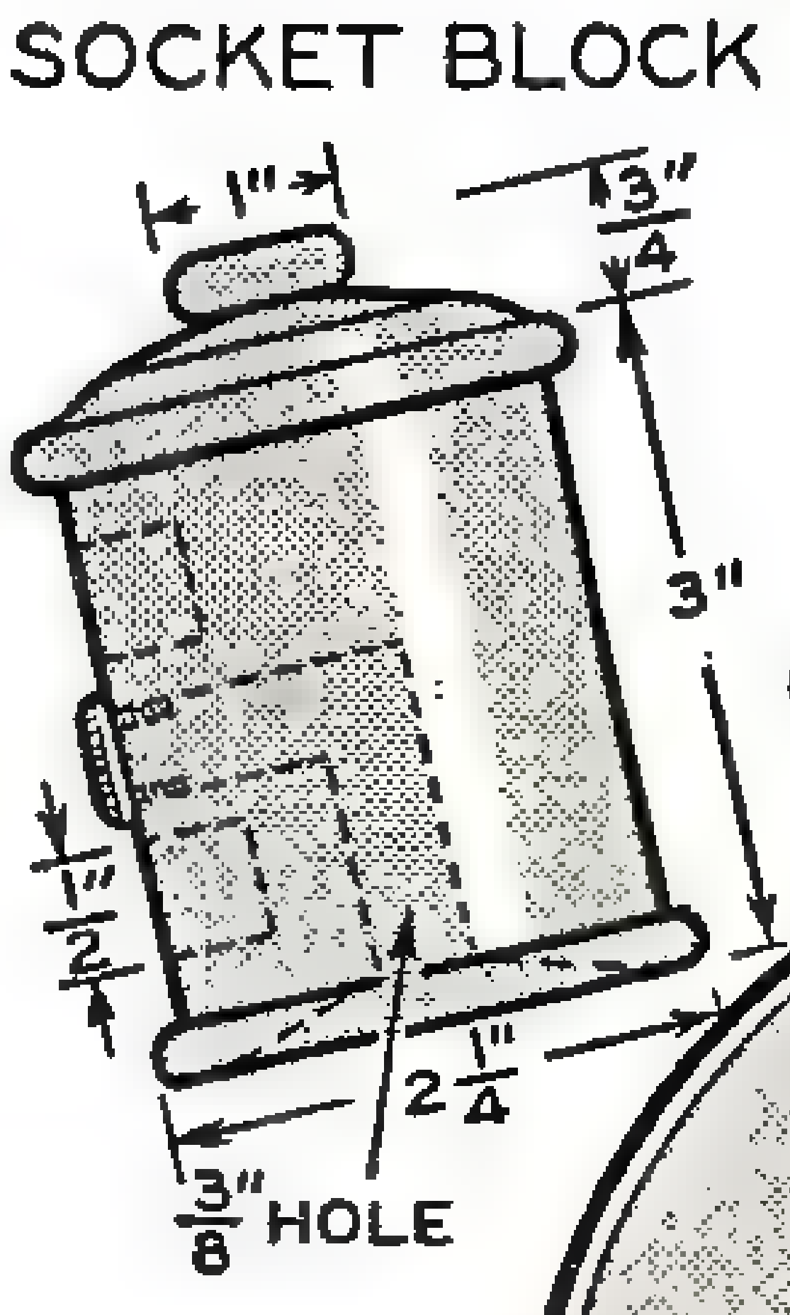
In assembling the lamp glue the dowel pins in place and draw all unions tight. Care must be taken that the lamp stands vertical and in such a position that the extension arm is directly above one of the legs.

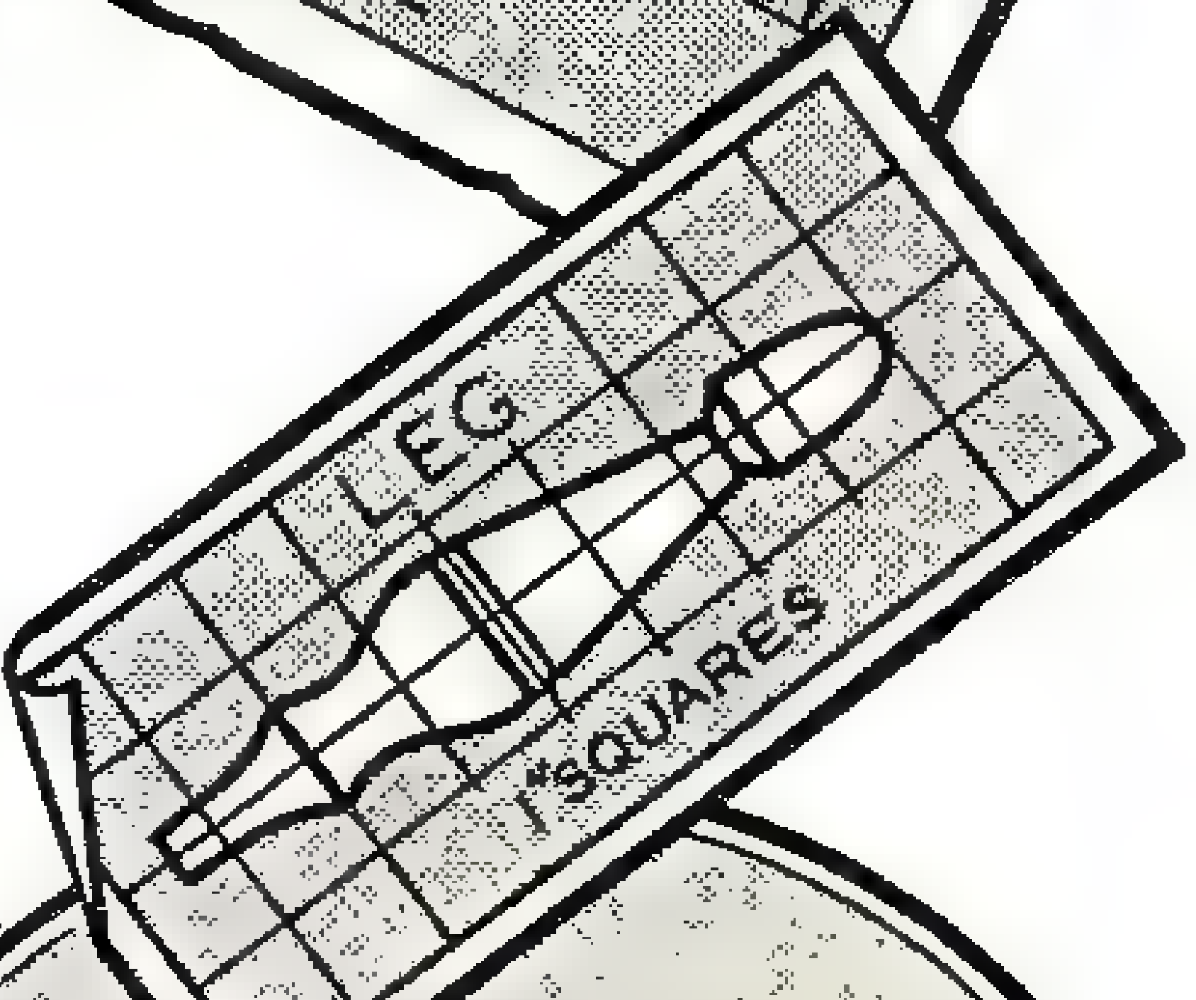
Let the lamp stand for twenty-four hours, or until the glue is thoroughly dry. Then screw ⅜" insulated bushings into the wire outlet holes in the bottom of the post and in the lamp fixture block.

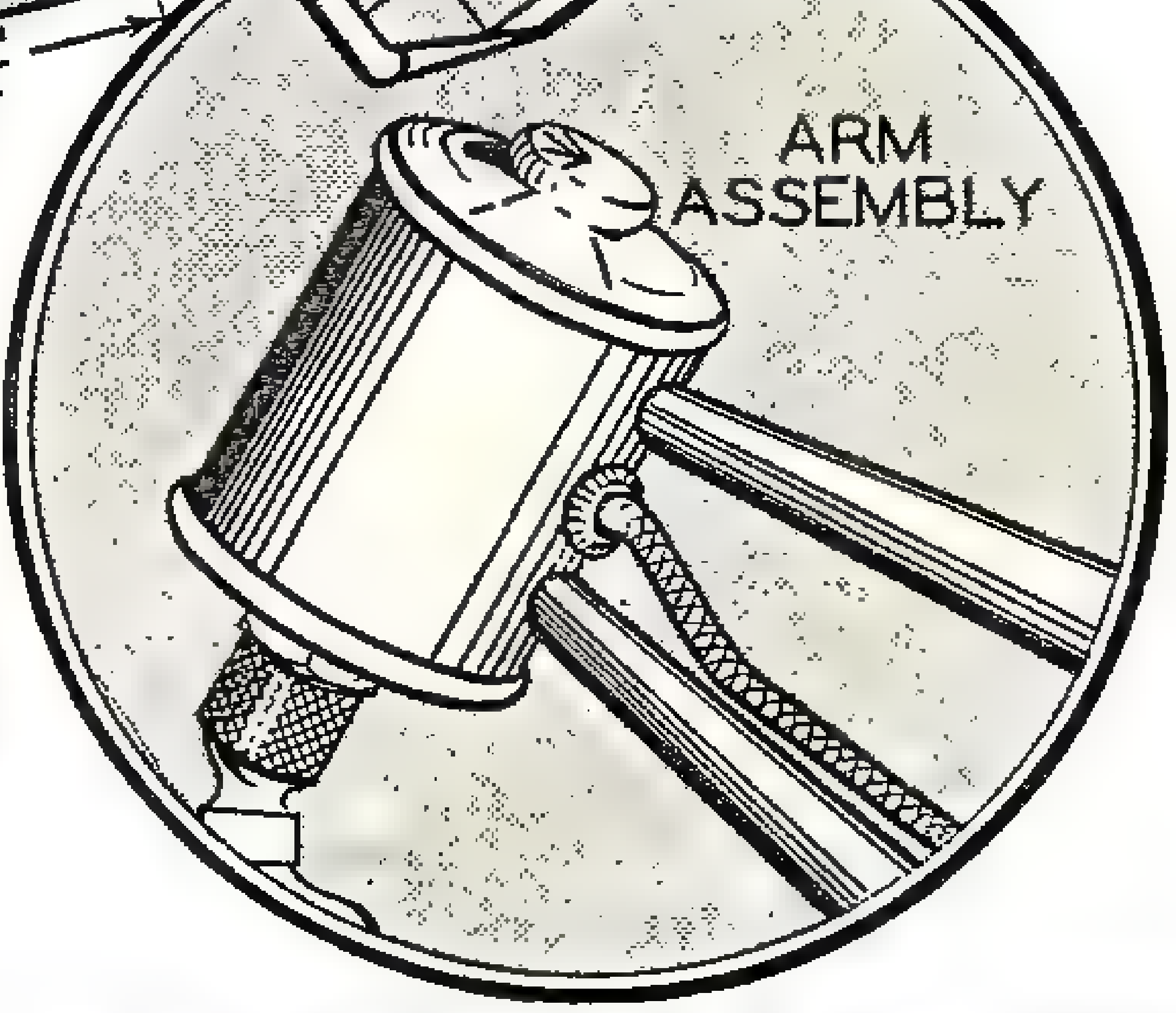
To simplify the task of wire threading pass a fine flexible wire or strong string through the post, then draw light cord through with it. Do likewise with the socket block, allowing enough free wire to permit adjustment of the extension arm. Use an adjustable socket fastened with a ⅜" pipe nipple.

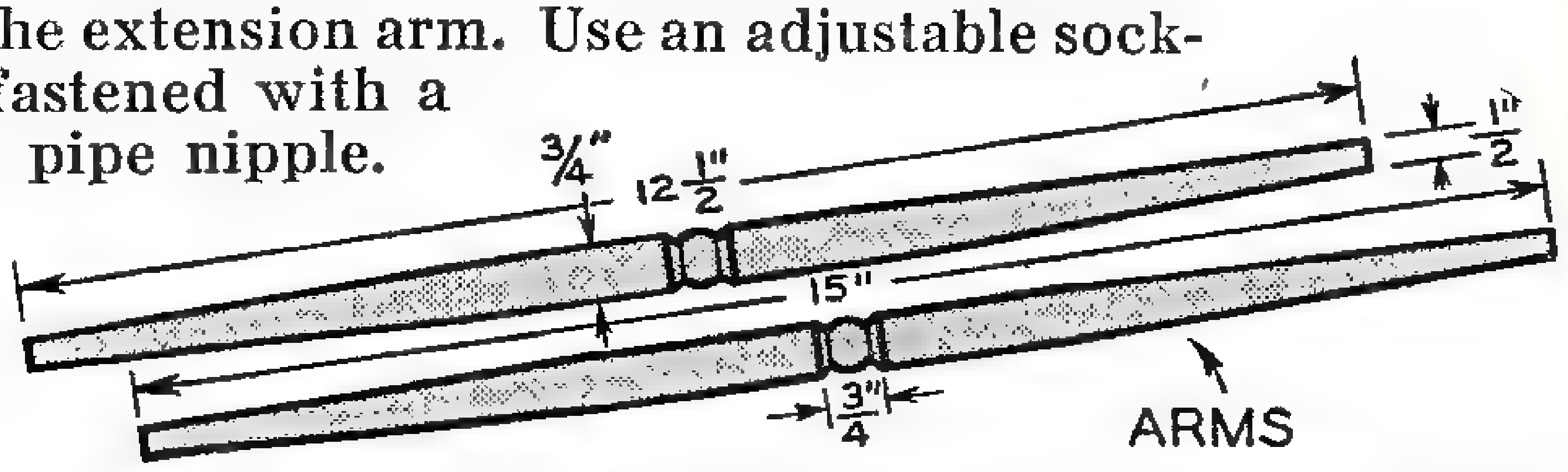








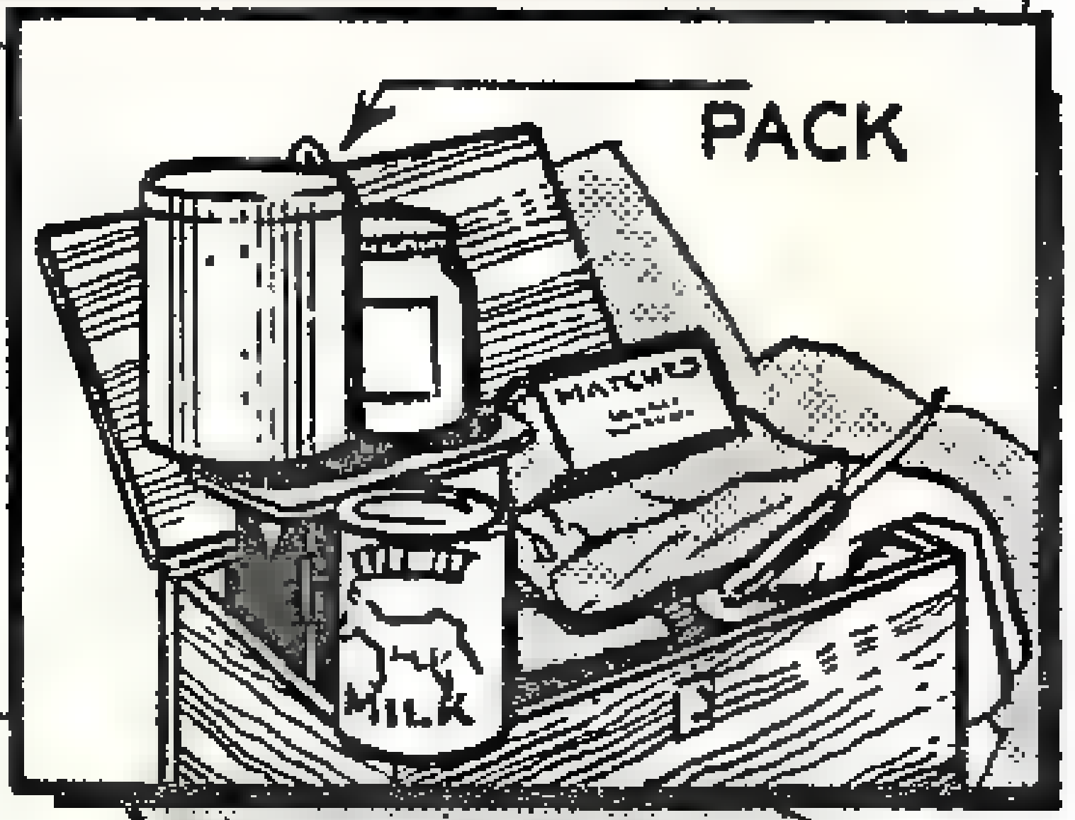


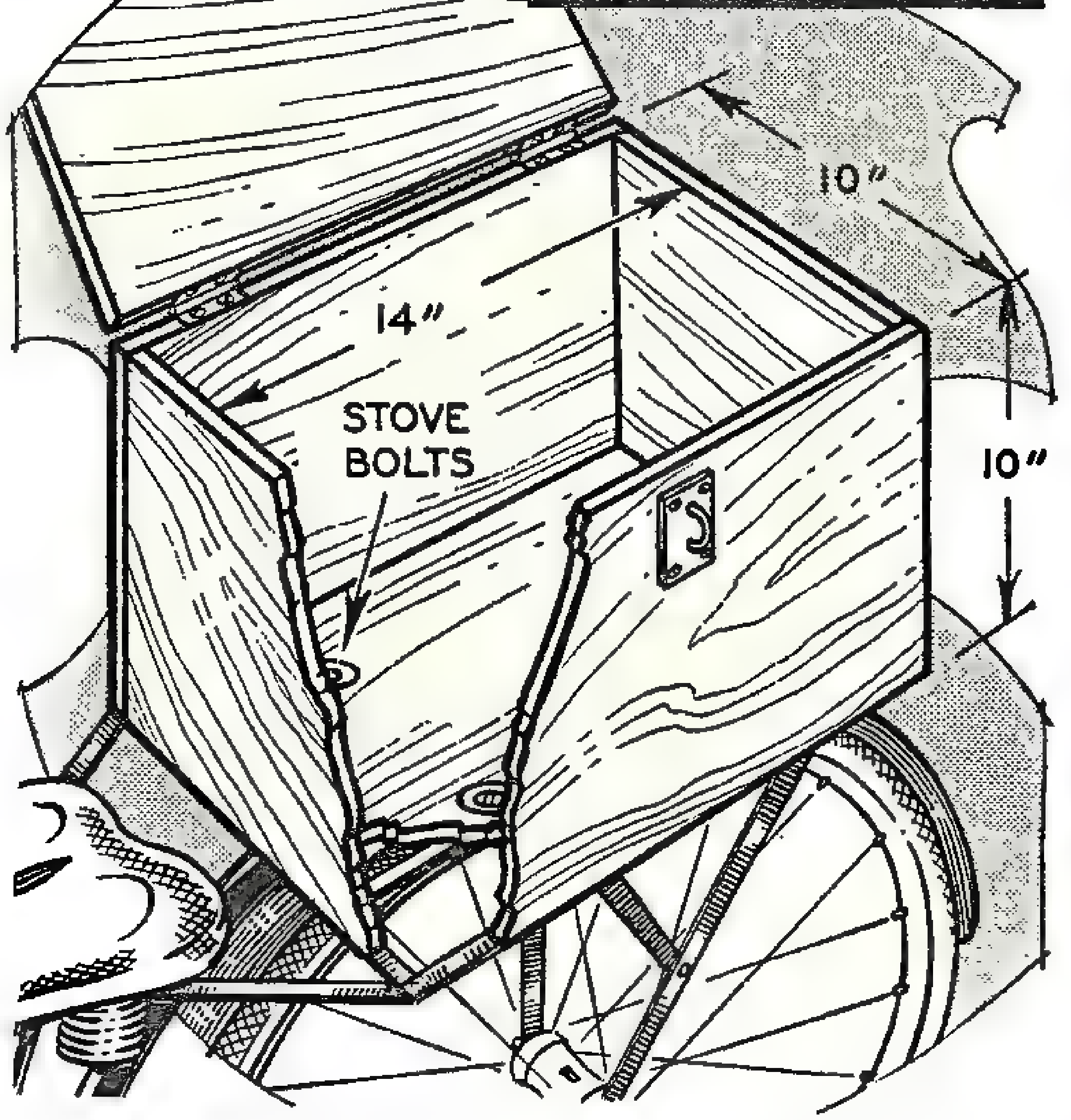


Circular inset above shows method of clamping boring jig to base of lamp, to aid in drilling holes for legs. Socket block is bored as indicated for arms and for lamp cord. Standard pull chain socket is fastened to socket block.

Travel Light on Week-end Bike Cruises in the Country

Eagle Scout Franz Wever travels light on week-end cruises over Minnesota's country roads. Blanket and poles for setting up lean-to sunshade are tied to carrier. Electric light is used for night travel.





Bolt food box to flat type carrier on bicycle. Clinch nuts on stove bolts with prick punch. Use padlock on cover.

A BICYCLE comes into its own on roads far off the beaten track, where farm and woodland scenes await the chap who knows how to prepare for a 50-mile week-end jaunt. The experienced traveler goes "light," taking only those things which he will absolutely need.

For "personals" the following are needed: A change of socks, one face towel, one dishtowel, one large heavy blanket, tooth brush, and first aid kit.

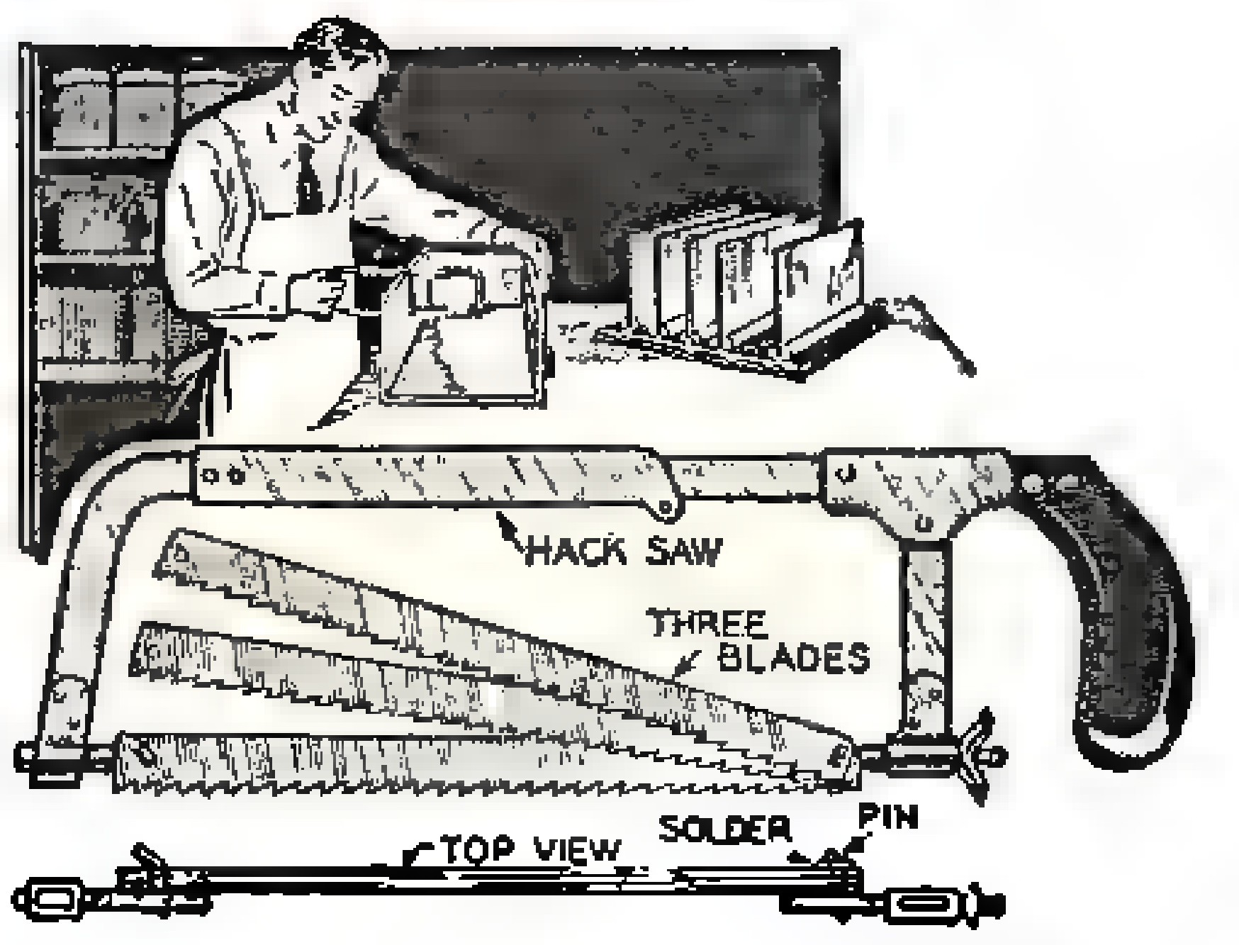
Food for 4 or 5 meals will include ¼ lb. of butter, 1 lb. bacon, coffee for three meals, 2 cans condensed milk, ½ loaf sliced bread, a small jar of Quaker oats, salt, and matches, all wrapped in waxed paper and packed in a big coffee tin. Eggs and fresh milk can be picked up at farmhouses. A few bars of sweet chocolate will furnish dessert.

For utensils take along a drinking cup, a small pot for boiling water, a knife and fork and a small frying pan.

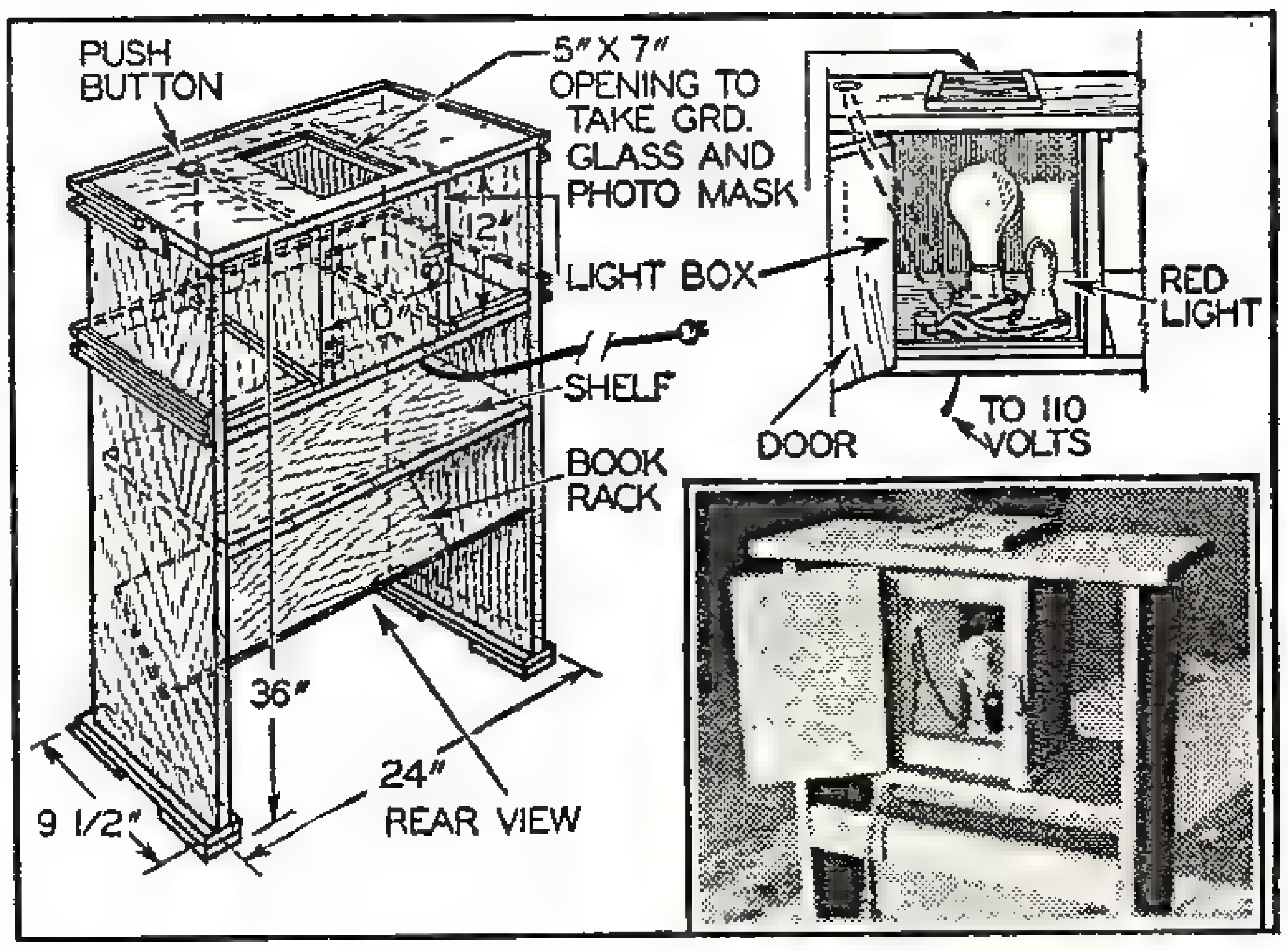
Tie on the blanket, sling a water canteen and camera over your shoulders, and set off to explore the byways of America!

3-Blade Hacksaw Cuts Grooves

ON THE ordinary hacksaw the pins supporting the blades are long enough to hold up to three blades. By building up the thickness of the blades in this way grooves of various widths can be cut in wood or metal. A drop of solder on the pins will hold the blades in place or larger pins can be placed on the hacksaw.



Cabinet Photo Printer Is Handy



Store books and photo supplies on shelves of this cabinet photo printer. Use either mask or adjustable printing frame above ground glass. Varnish or lacquer as desired.

WITH this photograph printing unit the amateur photo finisher will be able to turn out professional work.

Inside the light box are a photographic red light and a 100-watt frosted white light. The red light burns continuously, while the white light is switched on for the exposure by a conveniently located push button switch.

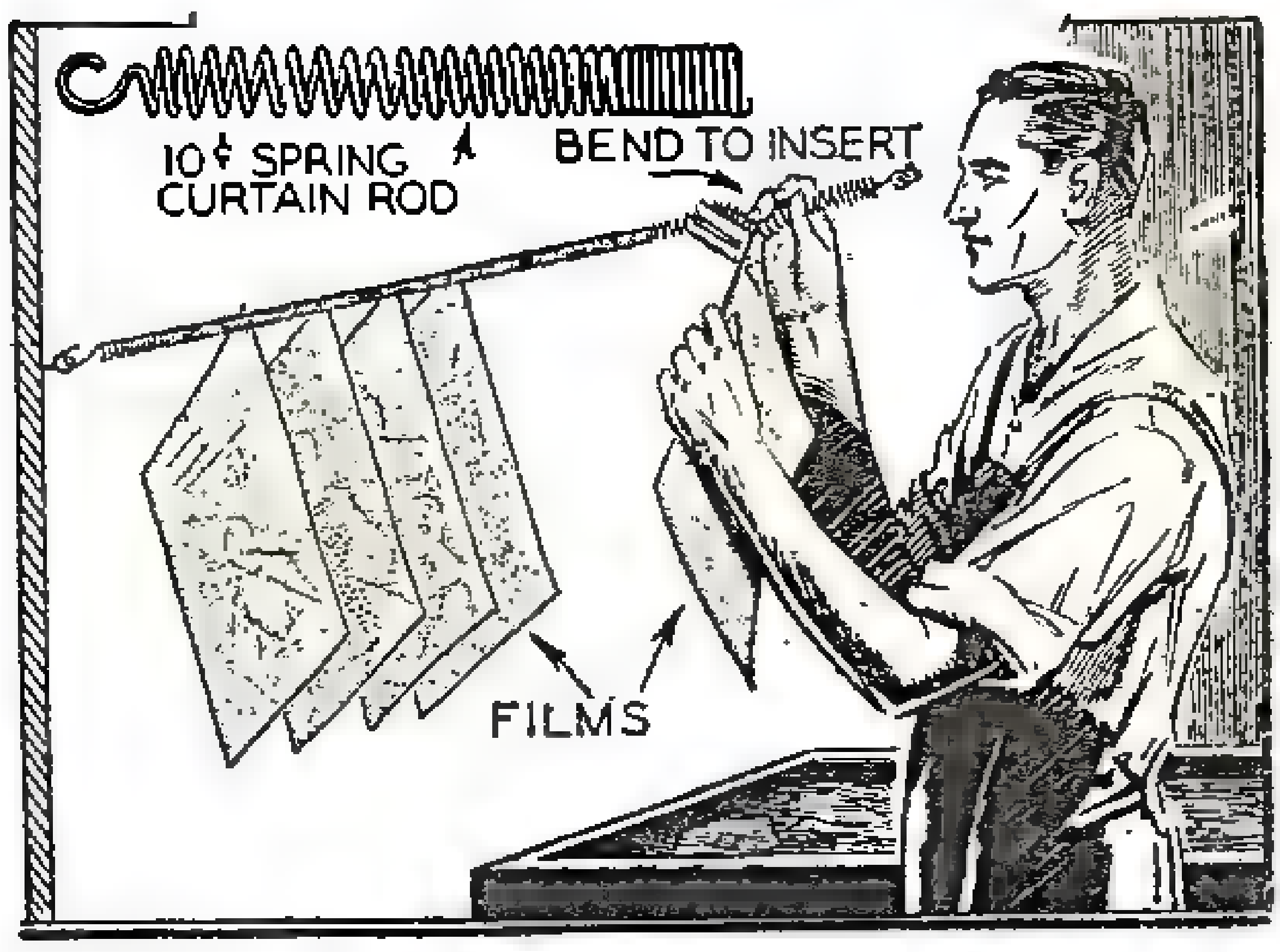
The door in the back of the light box must be made light-tight. Paint the inside of the box with aluminum paint to help diffuse the light.

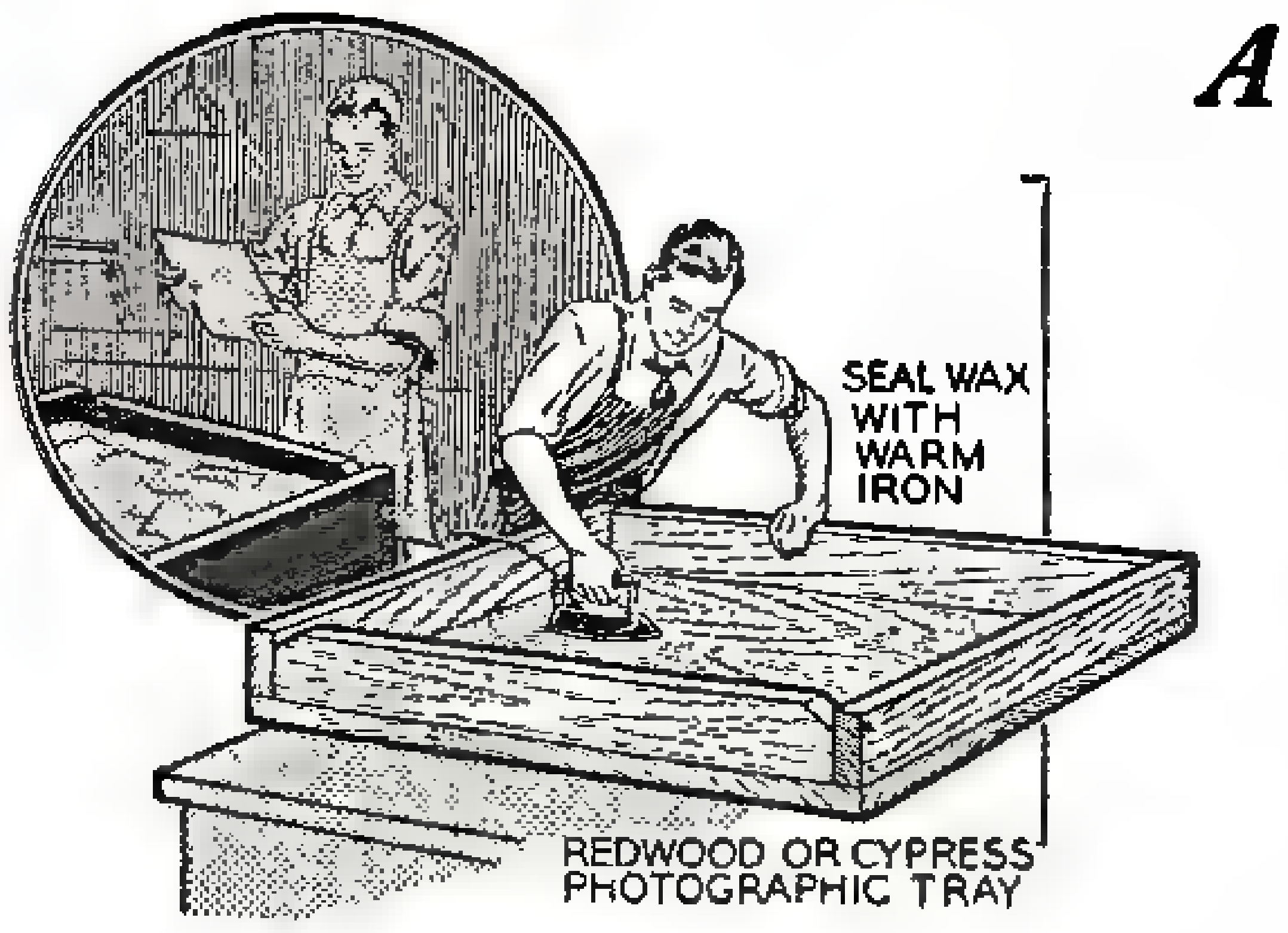
A pane of ground or frosted glass is fitted into the top, with an adjustable printing frame permanently fastened above it. This frame will take any negative up to 4"x6".

AMATEUR PHOTOGRAPHY KINKS

Use Spring Curtain Rod for Drying Films

WHEN a lot of films must be hung up to dry, it gets to be rather a nuisance to stick a safety pin into each film and hang them up by string. A spring curtain rod will prove much more convenient for this task. Mount the spring between two points in your darkroom with only enough tension to keep it from sagging. Bend the spring with the fingers to separate the spring coils, and slip in the negatives. The spring will snap back and hold the negatives firmly. Any one may be removed at will, or the entire batch released by stretching the spring.—M. Lonn.


10¢ SPRING CURTAIN ROD
BEND TO INSERT
FILMS

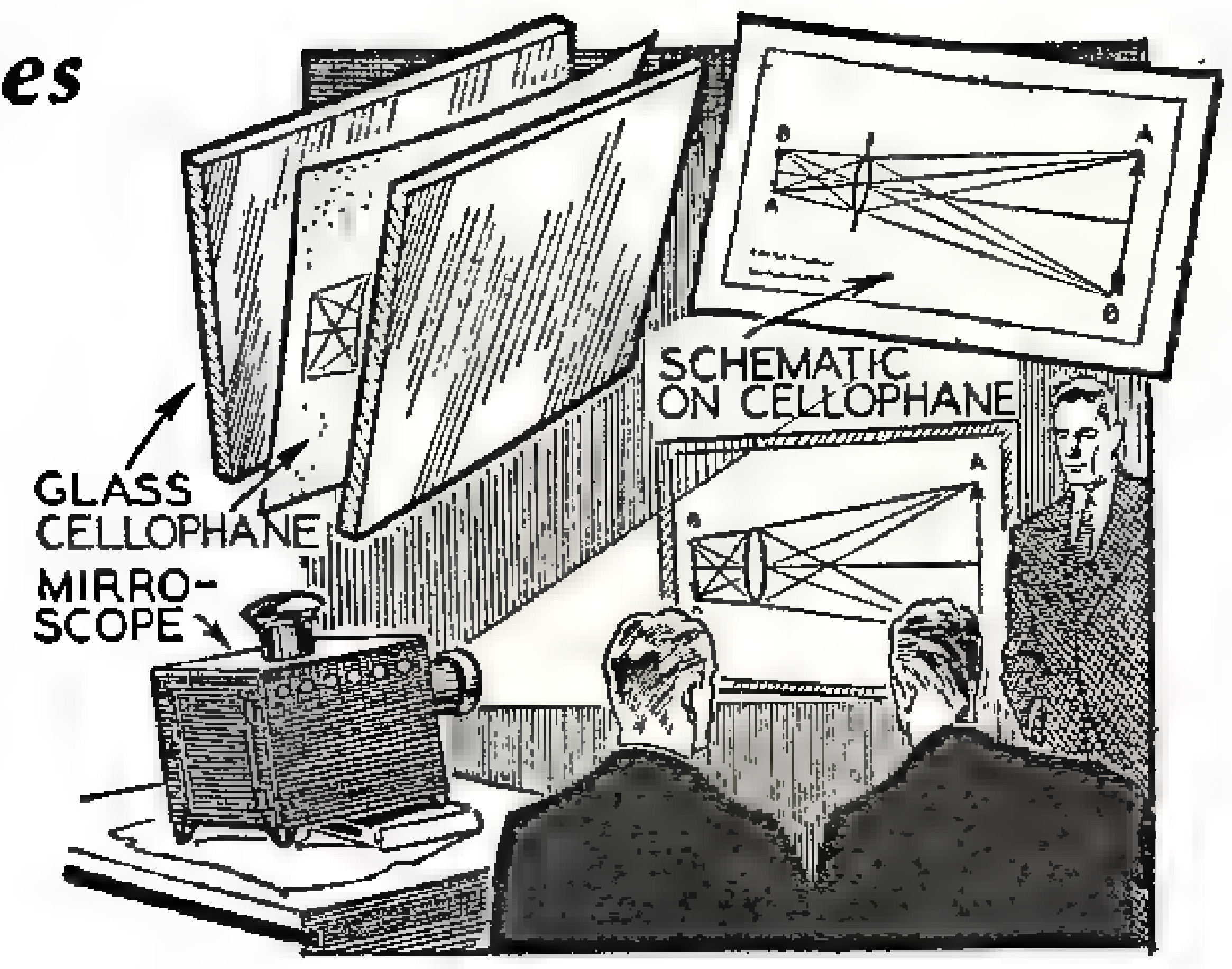

SEAL WAX WITH WARM IRON
REDWOOD OR CYPRESS PHOTOGRAPHIC TRAY

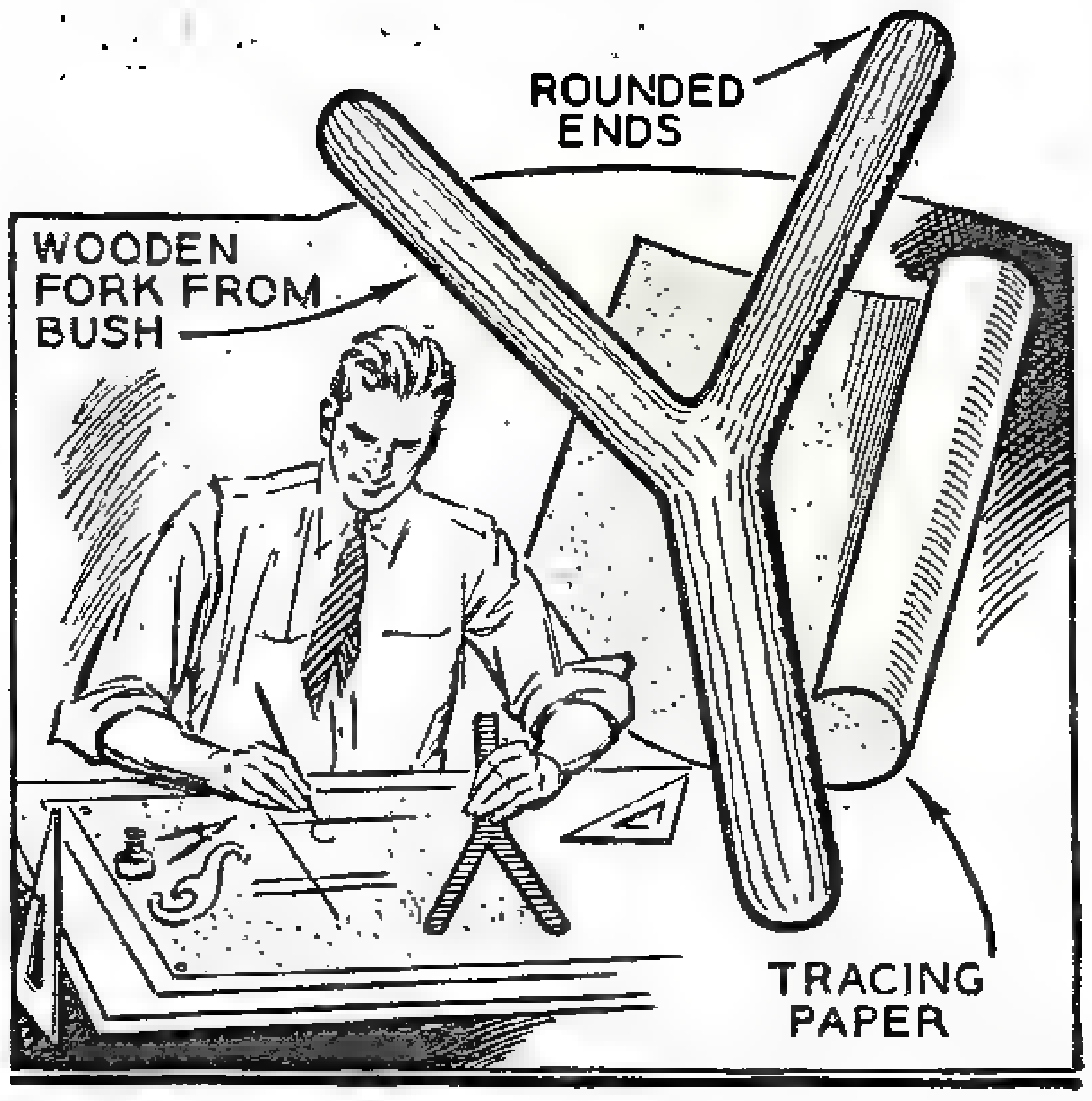
Acid-proof Wood Trays Ideal for Enlargements

AMATEURS occasionally need extra-large trays for enlargements. Get a piece of well seasoned one inch Redwood or Cypress large enough for the tray desired, and enough 3" wide wood for the sides. Paint edges and ends of the side pieces with white lead and fasten on top of the baseboard with long screws. Thoroughly fill all pores of wood on the inside of the tray with paraffin, using a hot electric iron to smooth out the wax. This makes the tray acid-proof.—H. A. Kay.

Ink Drawings on Cellophane for Lantern Slides

WHEN schematic diagrams are inked on glass plates for use in lantern slide projectors, the India ink loses its adhering properties and cracks off after it dries. Cellophane takes ink very well, and will last indefinitely if used for this purpose. After the diagram is inked and allowed to dry, slip the drawing between two pieces of $\frac{1}{16}$" glass, cement the pieces together, and place a binder around the edges to keep moisture from the cellophane.—T. A. Blanchard.


SCHEMATIC ON CELLOPHANE
GLASS
CELLOPHANE
MIRRO-SCOPE

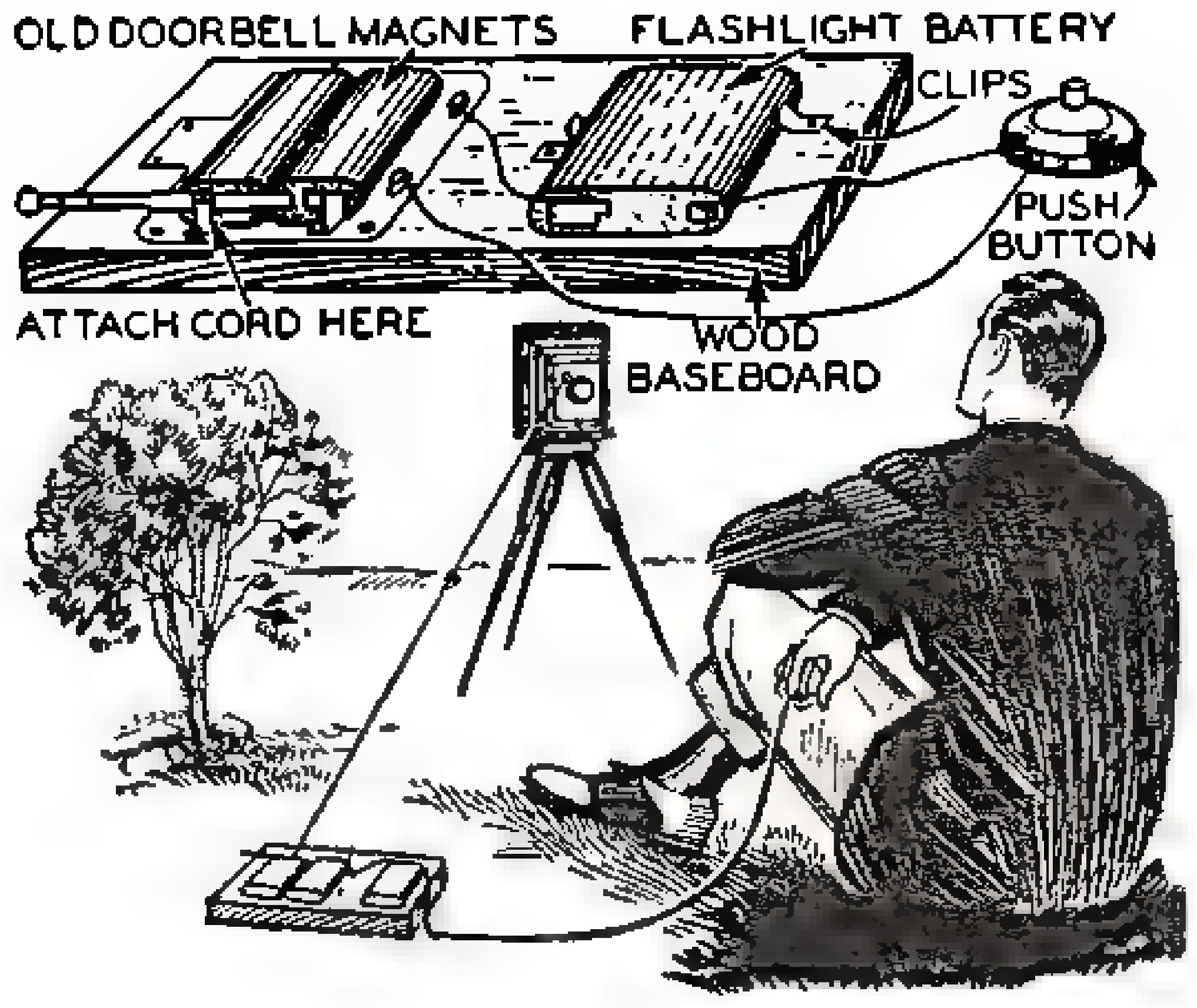

ROUNDED ENDS
WOODEN FORK FROM BUSH
TRACING PAPER

Fork Smooths Wrinkled Tracing Paper

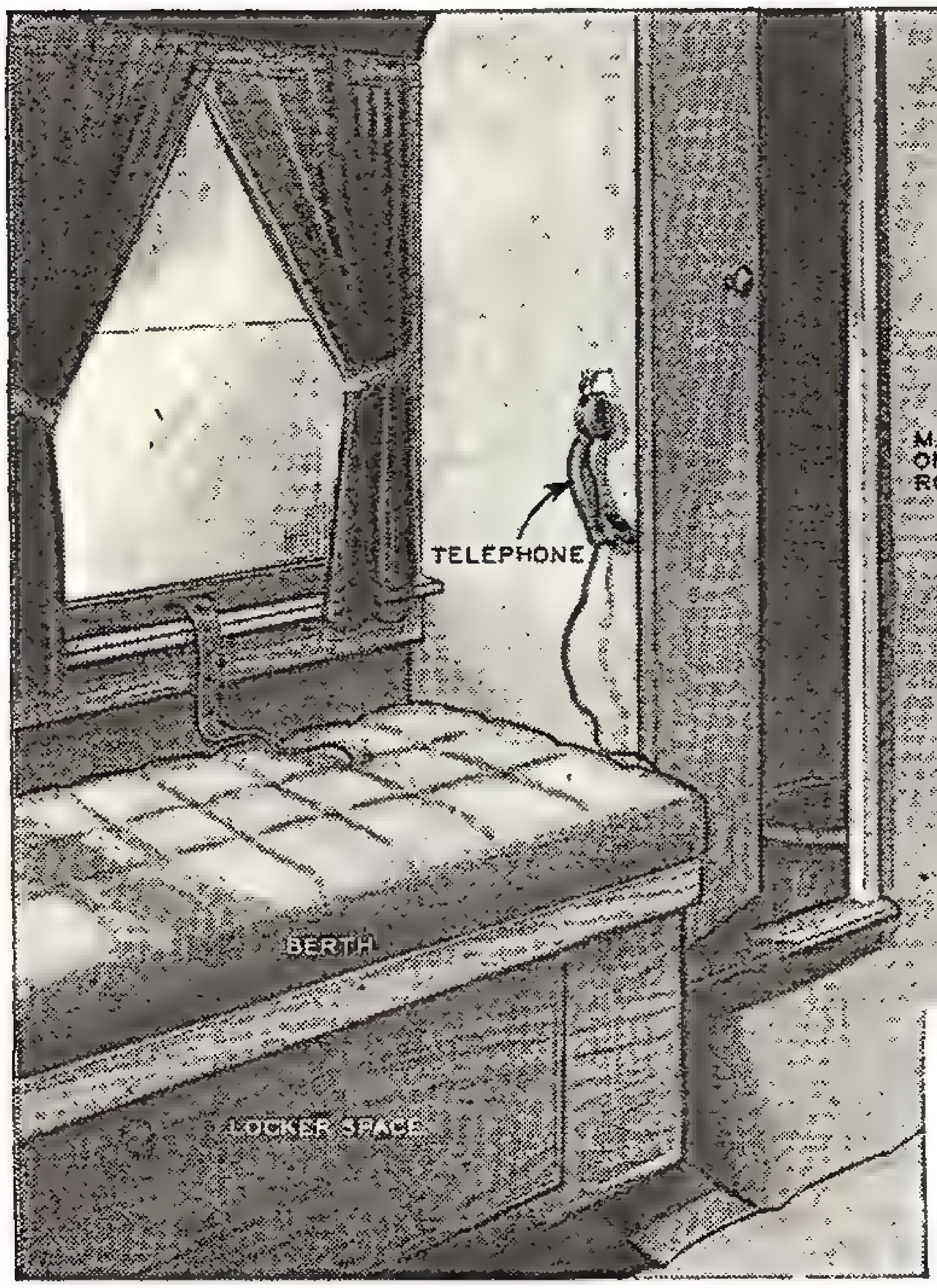
WHEN tracing paper is left on the drawing board over night, it will generally be badly wrinkled by morning. The paper must be pressed down before the drawing can be finished—a rather tedious task when done by hand. Cut a forked branch to about the size used for slingshots, and round off the edges with sandpaper. The two prongs of this wood fork will spread the tracing paper out smoothly, holding the paper down on the board so the lines underneath are plainly visible.—A. R. Jameson.

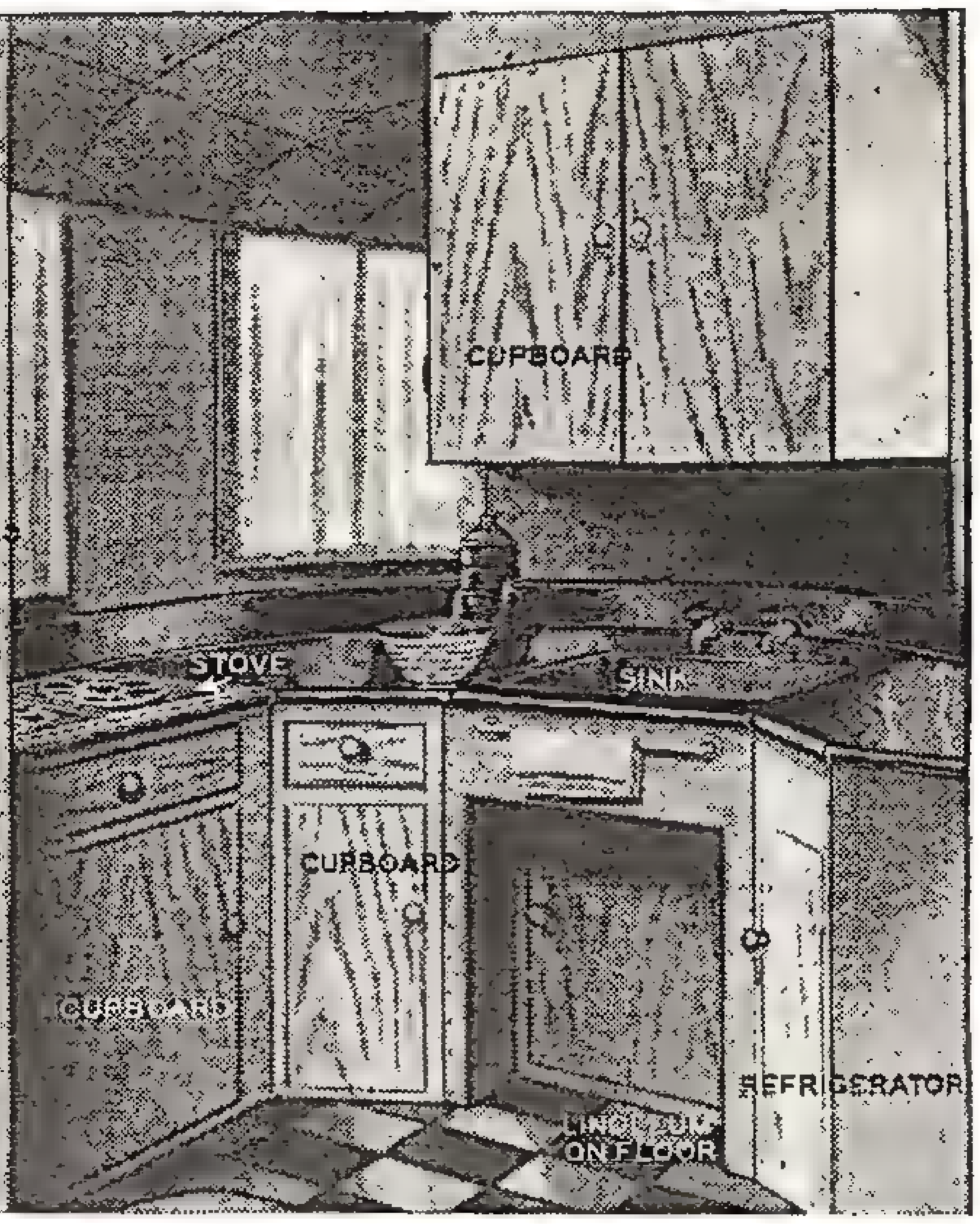
Electric Shutter Trip Operates Your Camera

A REMOTE control arrangement for tripping the camera shutter is readily made from an old doorbell and a flashlight battery. Mount the doorbell on a heavy block of wood. Run a string from the tip of the armature to the camera lever, and arrange the apparatus so that the camera lever is tripped when the armature pulls in. A push button switch may be used to close the circuit to the battery. With this arrangement self portraits are easy, and animal pictures may be taken from a distance.—C. A. McKeon.


OLD DOORBELL MAGNETS
FLASHLIGHT BATTERY
CLIPS
PUSH BUTTON
ATTACH CORD HERE
WOOD BASEBOARD

BUILDING the BODY of

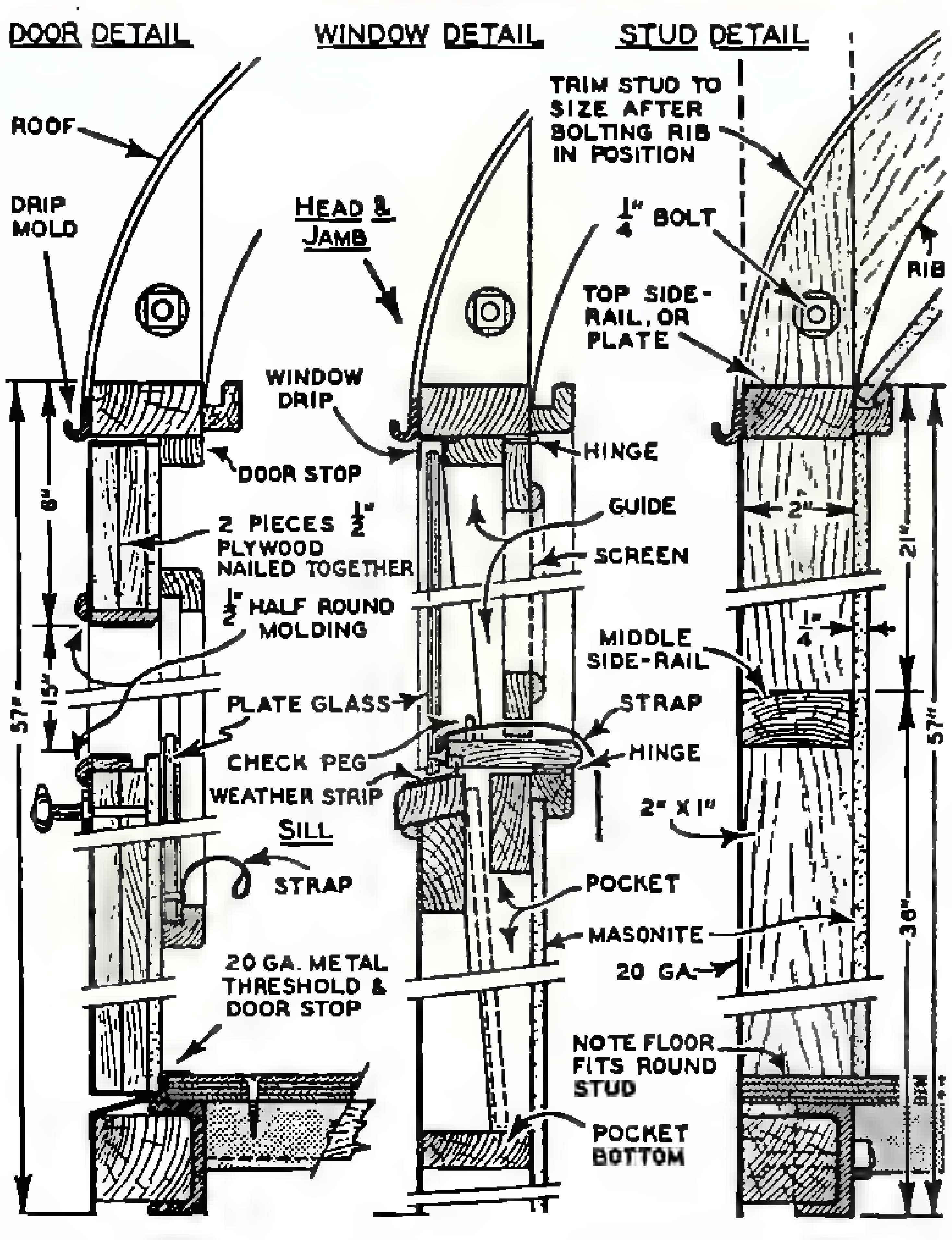

MASONITE WALLS ON SHOWER ROOM
TELEPHONE
BERTH
LOCKER SPACE


CUPBOARD
STOVE
SINK
CUPBOARD
CUPBOARD
REFRIGERATOR
LINOLEUM ON FLOOR

A neatly arranged interior, that is far from overcrowded, is a feature of "Aloha." Here is a view looking forward. Covering the floor with linoleum adds a finishing touch.

by ROBERT W. YORK

PART II


DOOR DETAIL
WINDOW DETAIL
STUD DETAIL
ROOF
DRIP MOLD
HEAD & JAMB
TRIM STUD TO SIZE AFTER BOLTING RIB IN POSITION
¼" BOLT
RIB
TOP SIDE-RAIL, OR PLATE
WINDOW DRIP
DOOR STOP
HINGE
GUIDE
SCREEN
2 PIECES ½" PLYWOOD NAILED TOGETHER
½" HALF ROUND MOLDING
MIDDLE SIDE-RAIL
PLATE GLASS
STRAP
CHECK PEG
HINGE
WEATHER STRIP
SILL
2" X 1"
STRAP
POCKET
MASONITE
20 GA.
20 GA. METAL THRESHOLD & DOOR STOP
NOTE FLOOR FITS ROUND STUD
POCKET BOTTOM
8"
15"
57"
2"
¼"
21"
57"
36"

CROSS SECTION THRU FRAME AT DOOR • WINDOW • AND STUDDING

Details of windows and door illustrate construction recommended. Flooring is laid to extreme edge of chassis sill frame except at door, as shown, and at wheel wells. Note that window stool and screen frame are hinged to permit window to be lowered. Auto door lock is best for door.

FITTED with a shower, telephone, berths, kitchen and plenty of storage space, "Aloha" without a doubt is the "trailer de luxe" for summer touring. Yet the body construction is no more difficult than the average trailer.

The body is built after the chassis is completed according to instructions covered in Part I in the July issue. Check the chassis to be certain it is square and plumb. The wheel alignment must be true and at right angles to the line of pull, which will be the chassis centerline.

Then you are ready to proceed with building up the body. Here a band saw would come in handy but if you haven't one you will be in no worse position than the writer. It will be noted in the chassis drawings, given in Part I, that the flanges of the channel iron face outward. This is in order that a wood member 1½x1¾ may fit snugly in the channel. This sill may be placed in two ways, either by steaming and bending to shape (see March, 1934, issue of MODERN MECHANIX AND INVENTIONS, page 109), or cutting in the required curve. In either case this wood sill is bolted to the channel iron using ¼" stove bolts placed at 2' centers.

Next cut the required number of frame

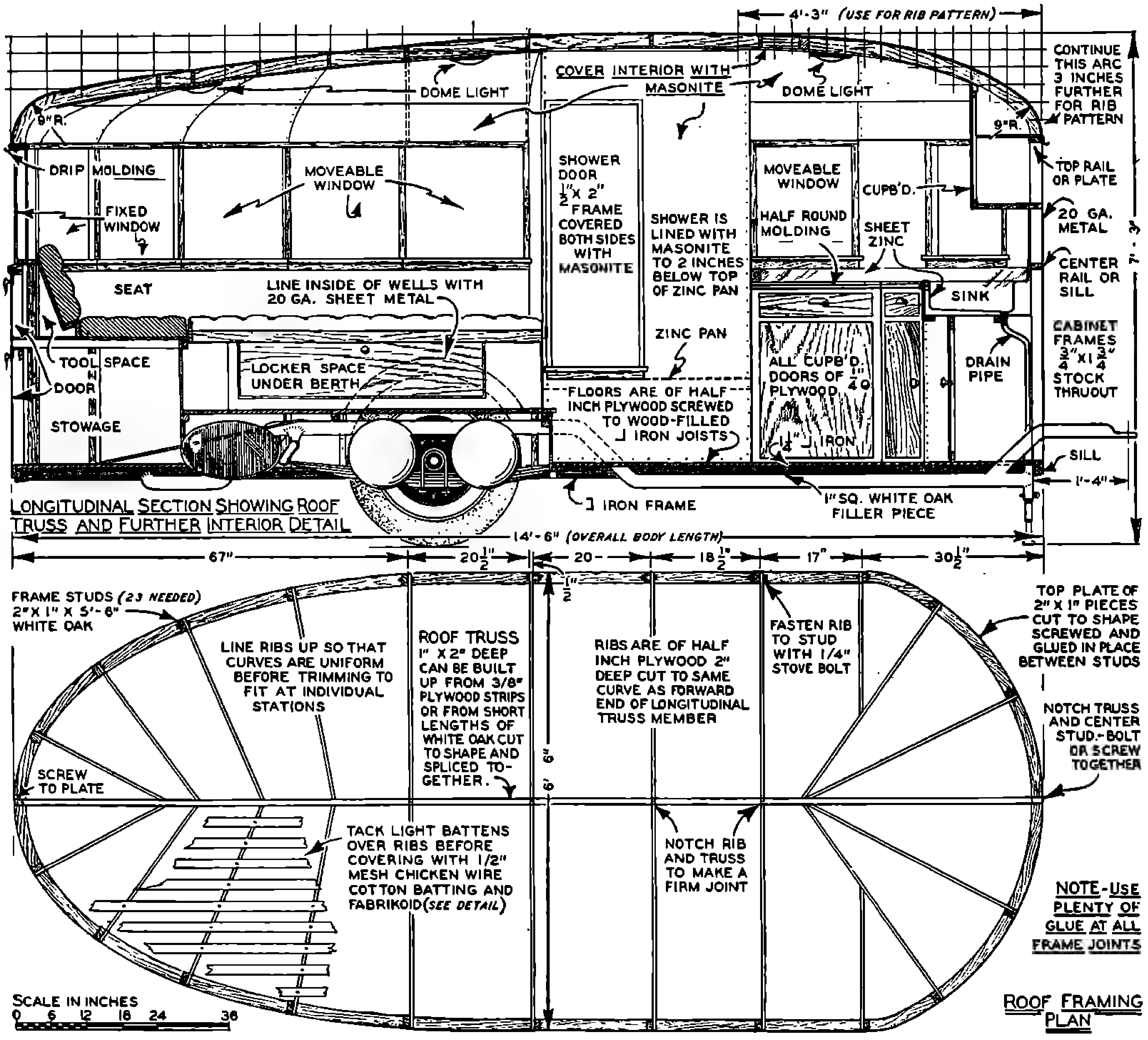
"ALOHA"—Trailer de Luxe

studs. The finished sizes should be 1"x2"x5'-6". At the dimensions shown on the plans ¾x¾x2" cleats are nailed on both faces of the studs to hold the side rail strips and plates. Notch out one end of each stud and the sill where the studs occur to form a snug mortise joint, and bolt the studs to the sill with ¼" stove bolts as shown in Part I. Be sure that the outer faces of the studs are flush with the outer face of the sill. Nailing strips are now to be placed where the lower set of cleats occur. To get the correct curves for these members lay the raw material on the sill between their respective studs and mark the outer curve of the sill at the same time keeping the inner edges in a straight line. Establish the respective angles at the ends for nailing to the studs to form a neat joint. This nailing strip need not be more than ¾" thick and occurs only where disappearing windows *are not* used. A study of the details will explain existing conditions there.

The top side rail or plate members are cut and fitted in a similar manner but inch stock is recommended here. Assuming that all the plate and nailing members are cut, take a pot of water-proof glue and use freely. Then nail the rails in place against the cleats using a fair size finishing nail. Temporarily brace the work so that it does not get out of square or plumb while the glue is drying.

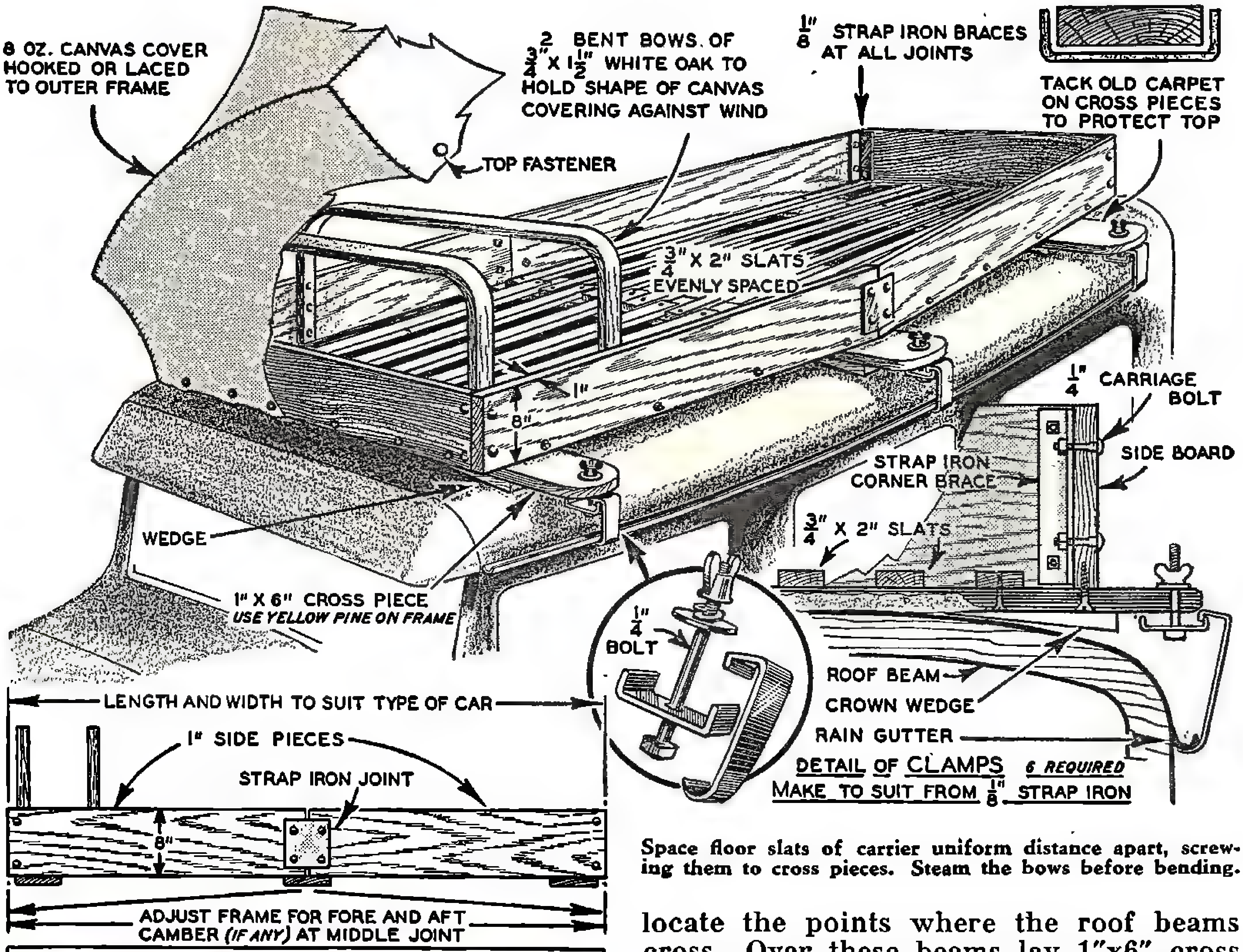
The roof is the next step and we begin by cutting the longitudinal truss member, the piece that runs from front to rear of the roof. Reference to the drawings will dis-

(Continued on page 122)

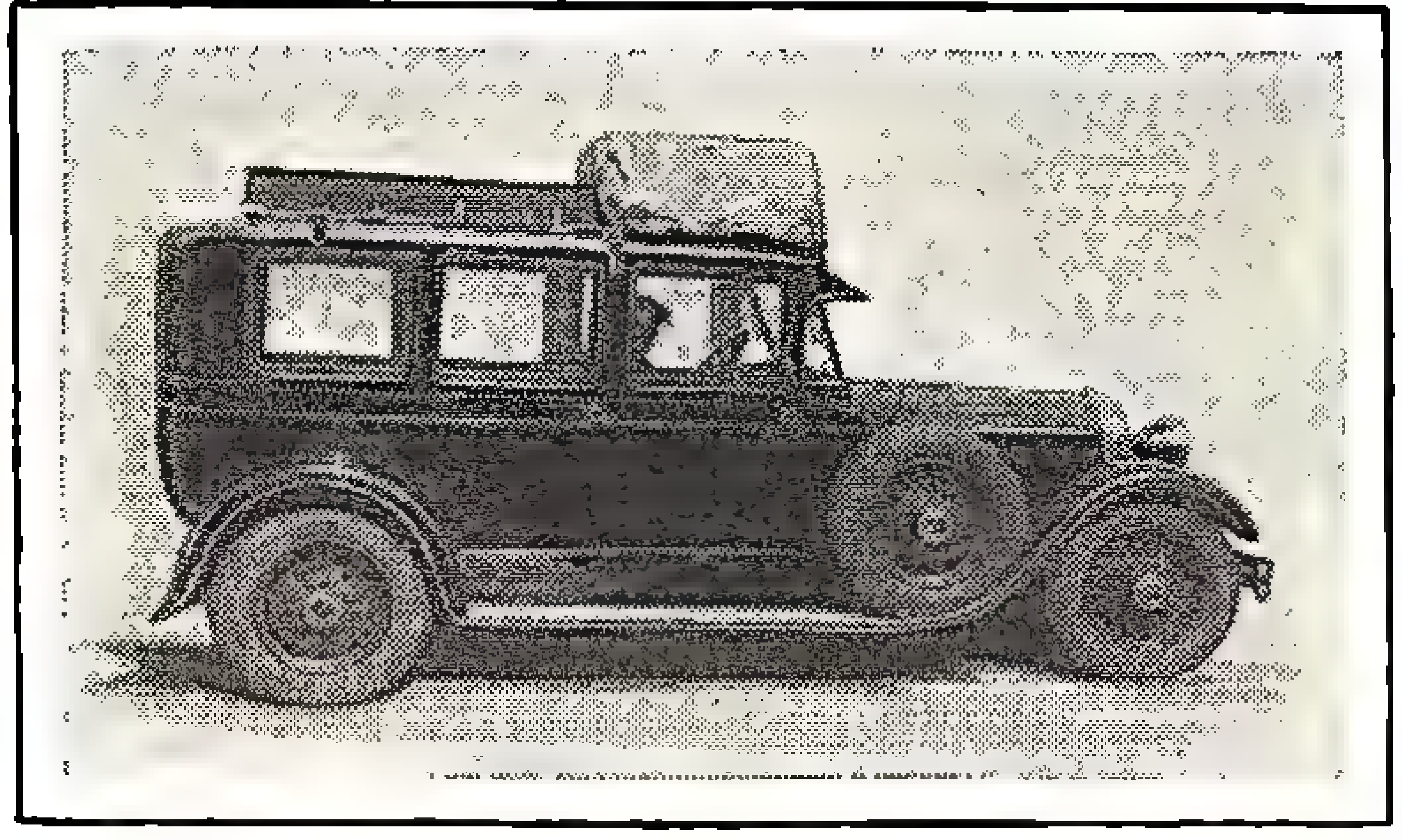

DOME LIGHT
9"R.
DRIP MOLDING
FIXED WINDOW
MOVEABLE WINDOW
SEAT
LINE INSIDE OF WELLS WITH 20 GA. SHEET METAL
TOOL SPACE
DOOR
STOWAGE
LOCKER SPACE UNDER BERTH
LONGITUDINAL SECTION SHOWING ROOF TRUSS AND FURTHER INTERIOR DETAIL
4'-3" (USE FOR RIB PATTERN)
COVER INTERIOR WITH MASONITE
DOME LIGHT
CONTINUE THIS ARC 3 INCHES FURTHER FOR RIB PATTERN
9"R.
SHOWER DOOR ½"x 2" FRAME COVERED BOTH SIDES WITH MASONITE
SHOWER IS LINED WITH MASONITE TO 2 INCHES BELOW TOP OF ZINC PAN
MOVEABLE WINDOW
HALF ROUND MOLDING
CUPB'D.
SHEET ZINC
TOP RAIL OR PLATE
20 GA. METAL
CENTER RAIL OR SILL
SINK
ZINC PAN
ALL CUPB'D. DOORS OF ¼" PLYWOOD
DRAIN PIPE
CABINET FRAMES ¾"x1¾" STOCK THRUOUT
FLOORS ARE OF HALF INCH PLYWOOD SCREWED TO WOOD-FILLED ⅃ IRON JOISTS
1¼" ⅃ IRON
SILL
1'-4"
7'-3"
] IRON FRAME
1" SQ. WHITE OAK FILLER PIECE
14'-6" (OVERALL BODY LENGTH)
67"
20½"
20
18½"
17"
30½"
½"
FRAME STUDS (23 NEEDED) 2"x 1" x 5'-6" WHITE OAK
LINE RIBS UP SO THAT CURVES ARE UNIFORM BEFORE TRIMMING TO FIT AT INDIVIDUAL STATIONS
ROOF TRUSS 1" x 2" DEEP CAN BE BUILT UP FROM 3/8" PLYWOOD STRIPS OR FROM SHORT LENGTHS OF WHITE OAK CUT TO SHAPE AND SPLICED TOGETHER.
6'-6"
RIBS ARE OF HALF INCH PLYWOOD 2" DEEP CUT TO SAME CURVE AS FORWARD END OF LONGITUDINAL TRUSS MEMBER
FASTEN RIB TO STUD WITH 1/4" STOVE BOLT
TOP PLATE OF 2" x 1" PIECES CUT TO SHAPE SCREWED AND GLUED IN PLACE BETWEEN STUDS
NOTCH TRUSS AND CENTER STUD.-BOLT OR SCREW TOGETHER
SCREW TO PLATE
TACK LIGHT BATTENS OVER RIBS BEFORE COVERING WITH 1/2" MESH CHICKEN WIRE COTTON BATTING AND FABRIKOID (SEE DETAIL)
NOTCH RIB AND TRUSS TO MAKE A FIRM JOINT
NOTE-USE PLENTY OF GLUE AT ALL FRAME JOINTS
SCALE IN INCHES
0 6 12 18 24 36
ROOF FRAMING PLAN

Studs, 23 in number, are bolted to chassis sill frame as shown in Part I. Front center stud, attached last, is not fastened to sill but to center rail because of trailer hitch. The pattern for the lengthwise truss of the roof is also used for laying out ribs. Tire pump develops air pressure in tanks under body to force water to the shower and sink.

Wyoming Top Makes Ideal Luggage Carrier


8 OZ. CANVAS COVER HOOKED OR LACED TO OUTER FRAME
2 BENT BOWS OF 3/4" X 1 1/2" WHITE OAK TO HOLD SHAPE OF CANVAS COVERING AGAINST WIND
1/8" STRAP IRON BRACES AT ALL JOINTS
TACK OLD CARPET ON CROSS PIECES TO PROTECT TOP
TOP FASTENER
3/4" X 2" SLATS EVENLY SPACED
1"
8"
1/4" CARRIAGE BOLT
SIDE BOARD
STRAP IRON CORNER BRACE
3/4" X 2" SLATS
WEDGE
1" X 6" CROSS PIECE
USE YELLOW PINE ON FRAME
1/4" BOLT
ROOF BEAM
CROWN WEDGE
RAIN GUTTER
DETAIL OF CLAMPS 6 REQUIRED
MAKE TO SUIT FROM 1/8" STRAP IRON
LENGTH AND WIDTH TO SUIT TYPE OF CAR
1" SIDE PIECES
STRAP IRON JOINT
8"
ADJUST FRAME FOR FORE AND AFT CAMBER (IF ANY) AT MIDDLE JOINT

Space floor slats of carrier uniform distance apart, screwing them to cross pieces. Steam the bows before bending.



Wyoming Top as it appears on the car. Canvas cover holds luggage in place, protecting it against rain and dust. Entire carrier is easily removed when not needed.

OUT in the mid-mountain states where roads are rough, auto trailers are not as popular as in other sections of the country. Instead about every third car has a Wyoming Top built on the roof. With cars equipped in this way the owners can drive without stopping to see if the trailer is still hooked onto the automobile.

The Wyoming Top carrier is comparatively easy to build and is readily removed when not needed. It will carry surprisingly heavy loads on any car having husky roof beams.

By feeling through the top fabric you can locate the points where the roof beams cross. Over these beams lay 1"x6" cross pieces, with carpeting underneath to prevent chafing. Wedges under the ends of these pieces distribute the load uniformly over the car top.

Sides of 1"x8" yellow pine or spruce are fastened to the cross pieces, using strap iron angles to hold the corners together. Any curve of the body can be taken care of at the middle joints, as shown.

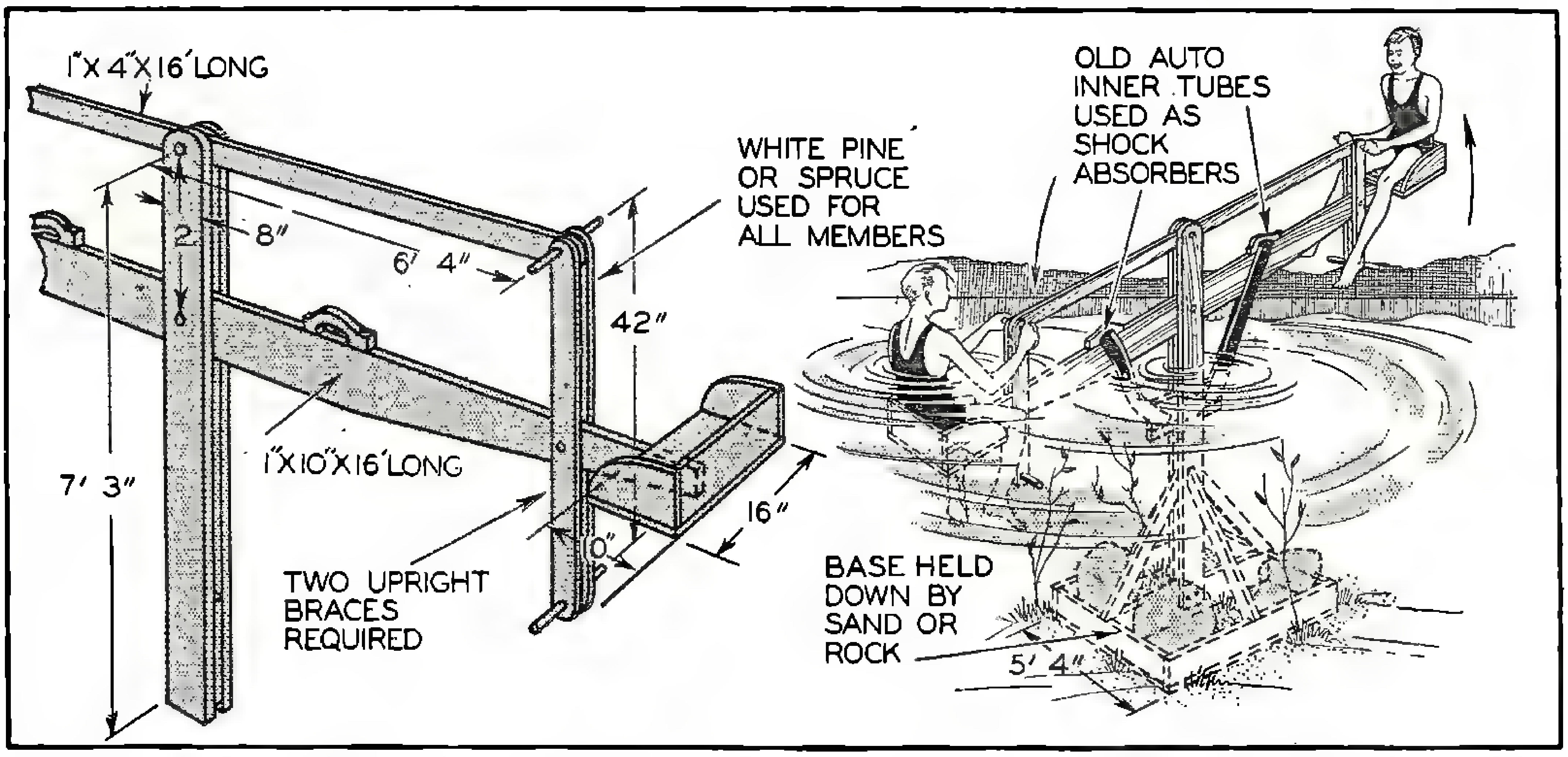
Slats of ¾"x2" spruce are screwed down over the cross pieces to form the floor of the carrier.

Oak bows are steamed to shape and bolted to the front ends. These hold the shape of the canvas cover against the wind and prevent light pieces of luggage from blowing out. The canvas cover is a refinement that is well worth-while, as it keeps out dust and rain.

The clamps which hold the carrier to the car are made of ⅛" strap iron. On most cars the solid rain gutter makes a fine catch for the hook. Lock nuts will prevent the bolts from loosening. Do not put more of a strain on the clamps than is necessary for anchoring the top.

If the rain gutter is weak, as it is on lighter cars, run ¼" tie rods down into the running boards to hold down the carrier.

Swimmin' Hole Teeter-Totter Gives New Water Thrills


1"X 4"X 16' LONG
2"
8"
6' 4"
42"
7' 3"
1"X 10"X 16' LONG
16"
10"
TWO UPRIGHT BRACES REQUIRED
WHITE PINE OR SPRUCE USED FOR ALL MEMBERS
OLD AUTO INNER TUBES USED AS SHOCK ABSORBERS
BASE HELD DOWN BY SAND OR ROCK
5' 4"

Fifteen dips a minute into the cooling waters, with all the thrills of diving, are possible with this swimming hole teeter.

ON THIS swimming hole teeter-totter you can enjoy the thrills of diving and bathing almost without effort. You can have great fun swinging in and out of the water, or ducking your friends.

The construction of the teeter is not at all hard. Use white pine or spruce for all members to avoid danger from slivers. Round off the edges with a plane or file, and, of course, put on several coats of good boat paint.

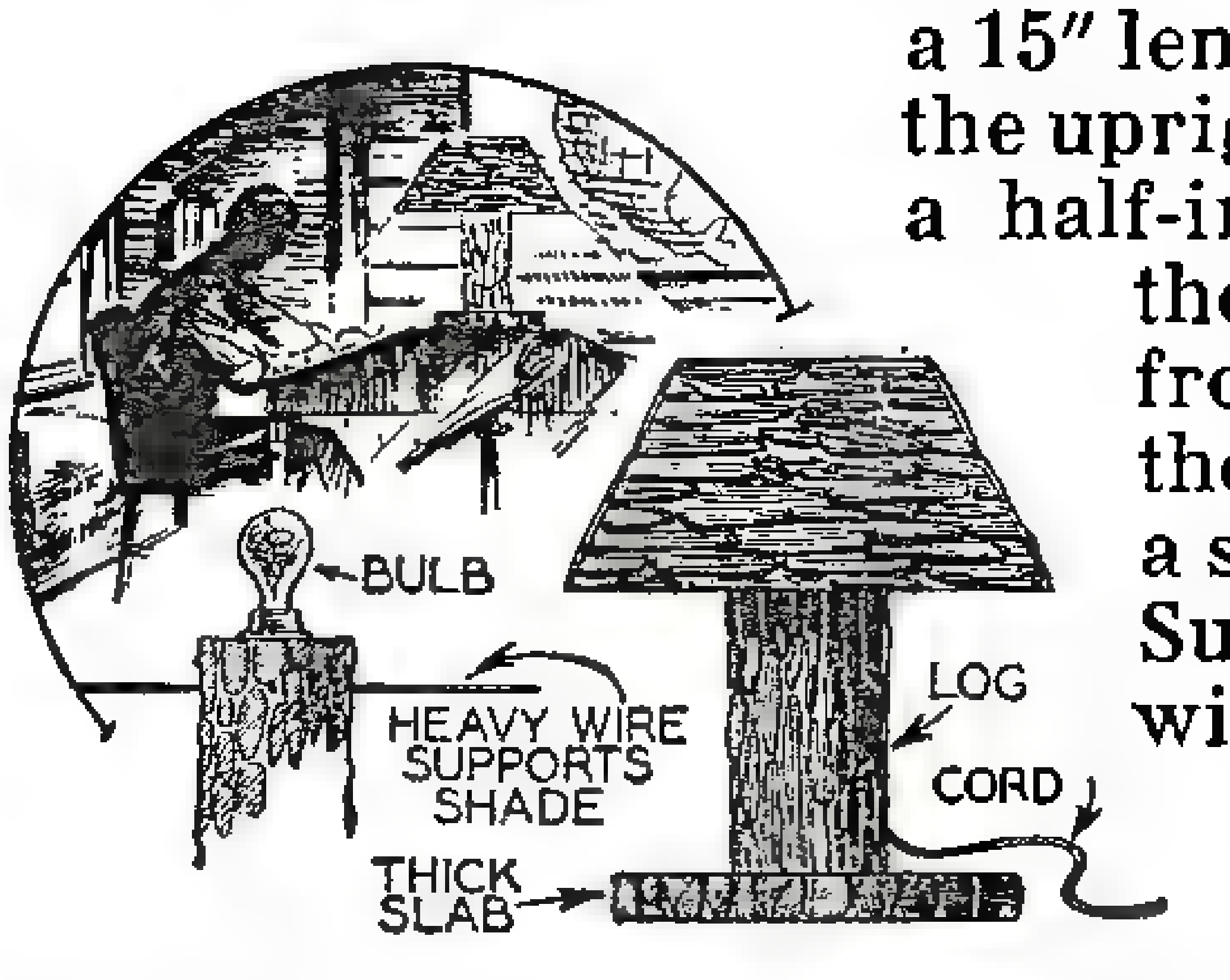
Broomsticks are used as pivots at the ends, the upper ones serving as hand grips, the lower as foot rests.

Old auto inner tubes are used as shock absorbers and to help reverse the motion. Adjust the position of the cleat on the cross arm to change the tension.

Install the teeter in about 4 feet of water, where the bottom is fairly level. Use large stones and sand to hold it down.

Rustic Log Lamp Ideal for Cabin

ONLY the light cord gives away this rustic back-woods lamp, for it appears to be made entirely of logs and slabs. Cut a 2" slab from a 14" diameter well seasoned log, leaving the bark intact, for the base. Select a 15" length of log for the upright, and bore a half-inch hole for the light cord from the top to the side. Mount a socket on top. Support shade with heavy iron wire. Give lamp a coat of varnish or shellac.

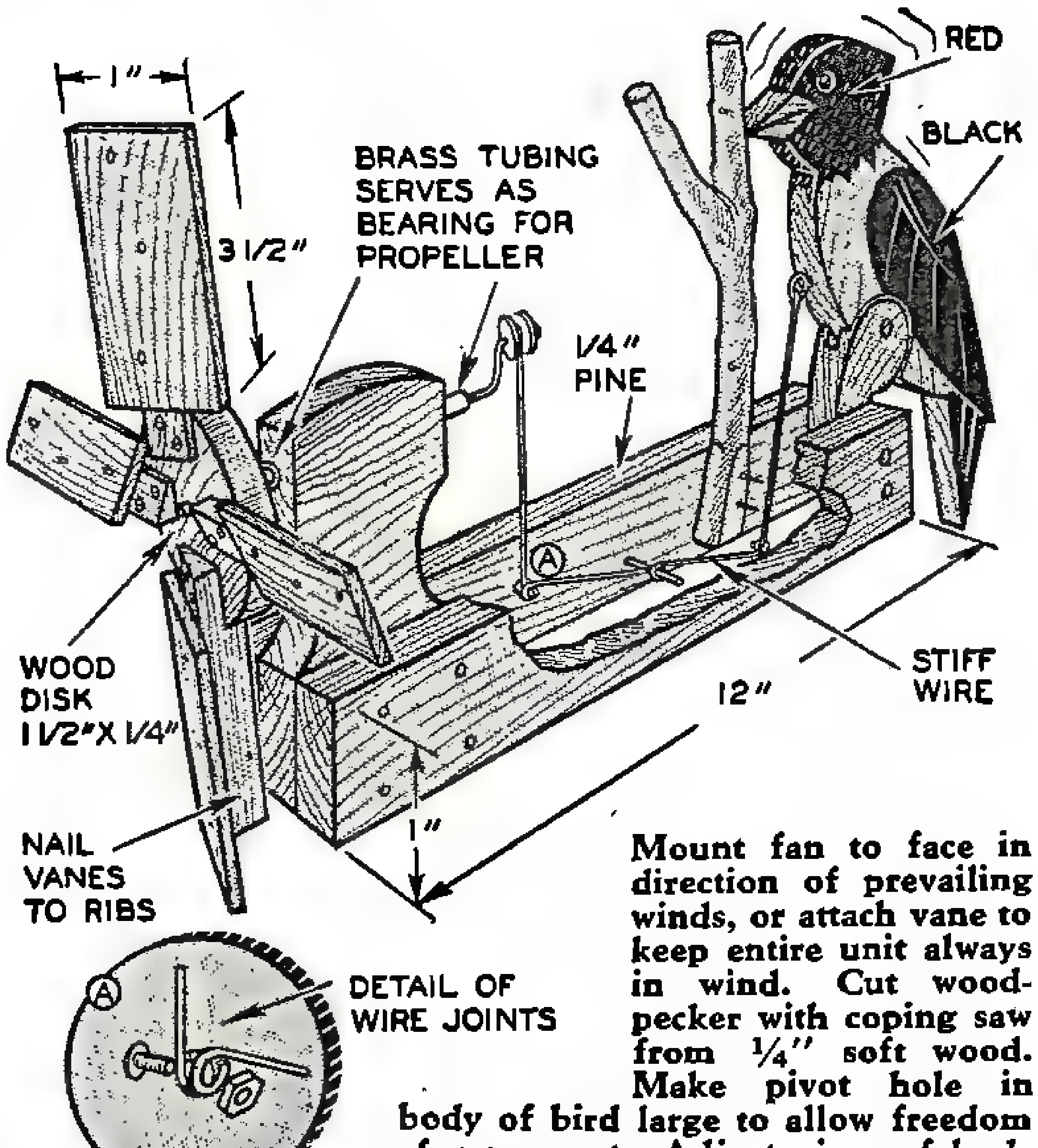

BULB
HEAVY WIRE SUPPORTS SHADE
LOG
CORD
THICK SLAB

Use at least 60-watt bulb in lamp. Tack bark over thin board form for shade.

Woodpecker Windmill for Lawn

IN FAIR weather and foul this novel little animated woodpecker plugs away at his tree, working lazily when the breeze is gentle, and faster as the wind becomes stronger. Painted in gay colors and mounted in your garden or on the lawn, he will attract plenty of attention.

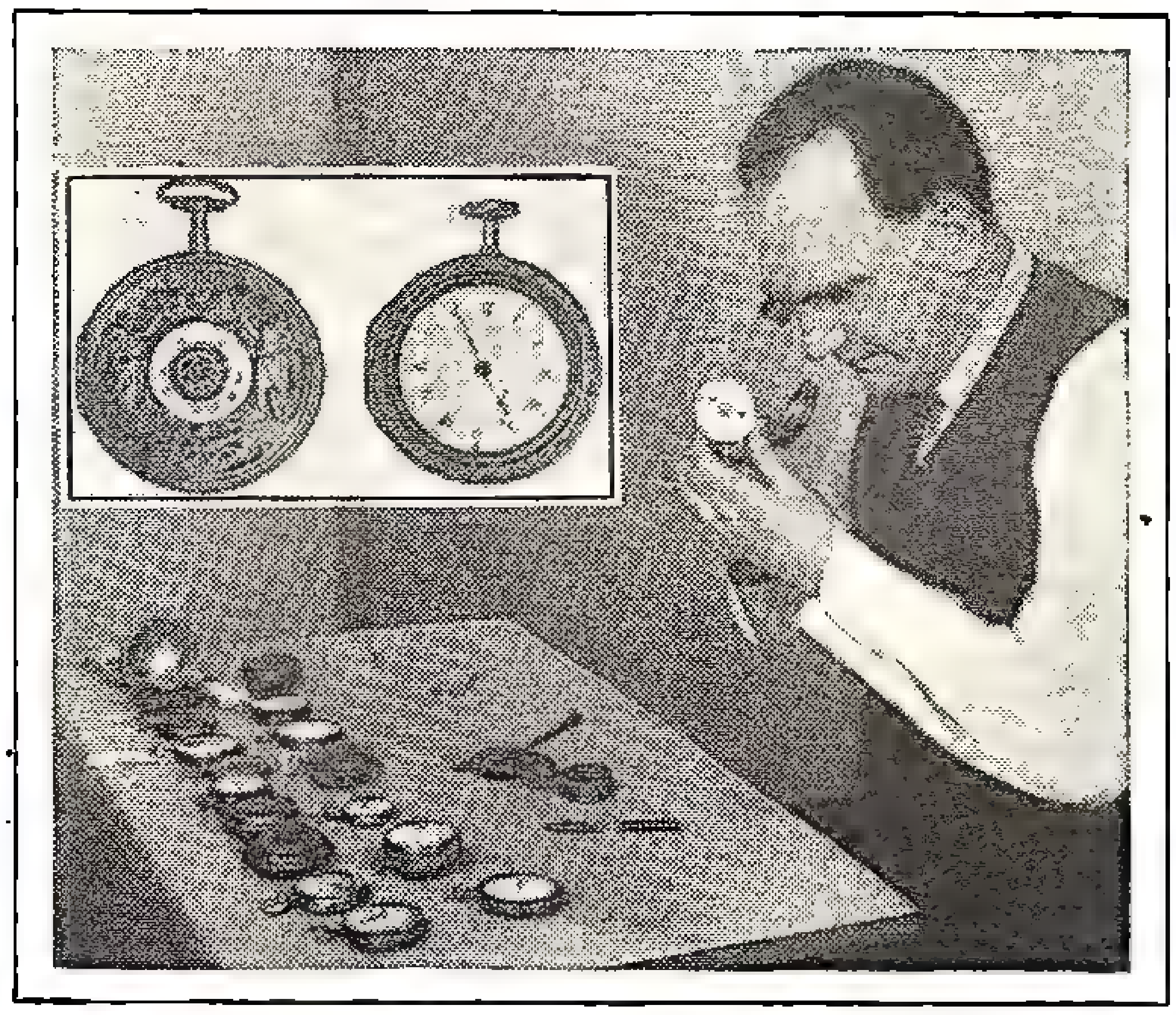
Almost any scrap wood can be used for the various parts. A length of brass tubing serves as a bearing for the propeller. Stiff wire levers pivoted as shown transmit the motion of the windmill to the bird. Use washers to take up all play between the bird and the base pieces. Mount about six feet above the ground, on a post.


1"
3 1/2"
BRASS TUBING SERVES AS BEARING FOR PROPELLER
1/4" PINE
RED
BLACK
A
WOOD DISK 1 1/2"X 1/4"
12"
STIFF WIRE
1"
NAIL VANES TO RIBS
A
DETAIL OF WIRE JOINTS

Mount fan to face in direction of prevailing winds, or attach vane to keep entire unit always in wind. Cut woodpecker with coping saw from 1/4" soft wood. Make pivot hole in body of bird large to allow freedom of movement. Adjust piece of bark so that the bird's bill just strikes it.

With the
COLLECTORS

Collection of Rare Old Watches Presents History of Time



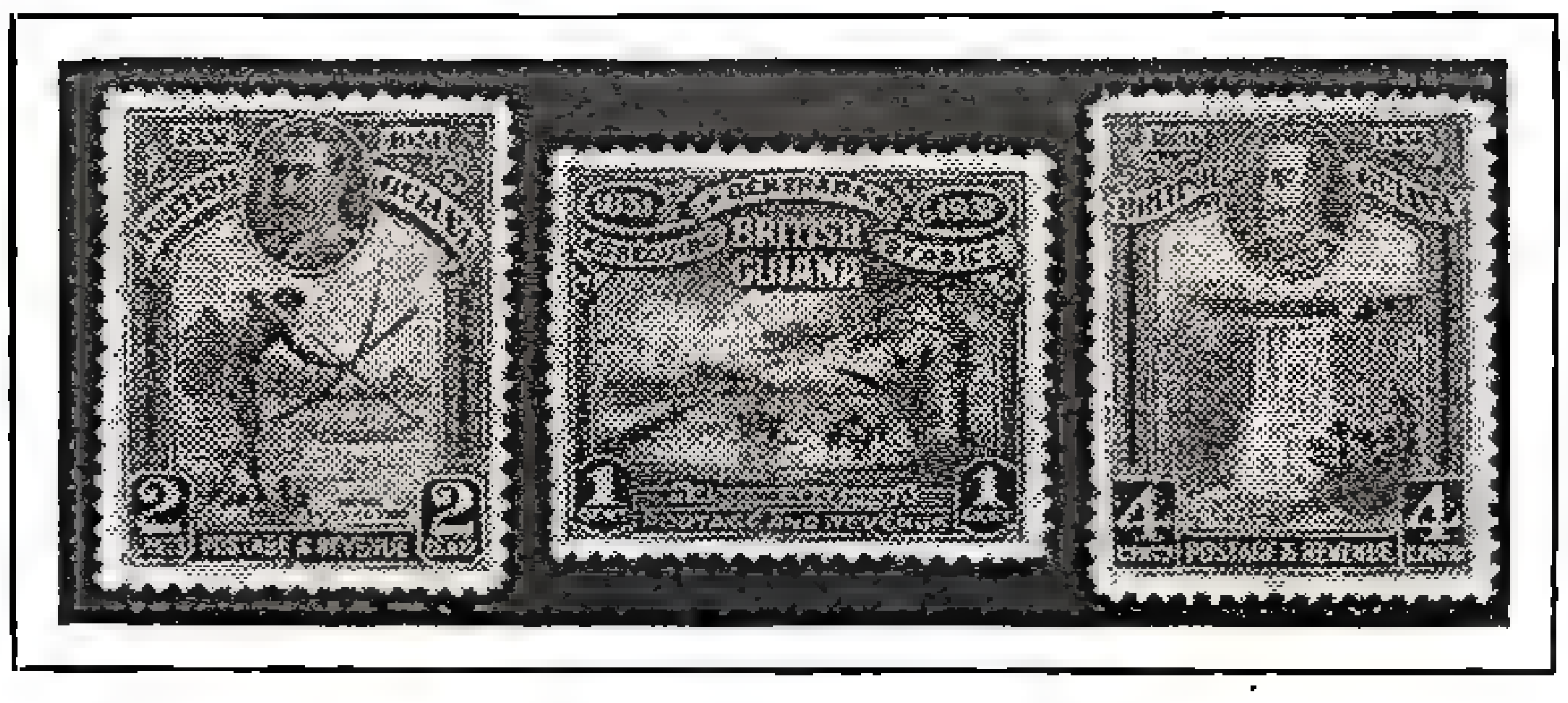
A veritable history of recording of time is this collection of watches, dating back to 1575. Upper left: Watch made for King George III of England, and Swiss chiming watch.

Stamp Shows Indian Shooting Fish

BRITISH Guiana announces a new set of twelve stamps for 1934. The central designs will be the same as those issued in 1931, but dates will be omitted from the border, and several new values added.

Perhaps the most interesting of the set is the 2 cent red showing an Indian shooting fish with a bow and arrow. On other stamps of the set are beautiful pictorial scenes showing natives plowing in a rice field, sugar cane being gathered in punts, and natives conducting business at Stabroek market, Georgetown.

The lower values of the set cost but little. The gay colors and beautiful engraving work will add interest to any album page.

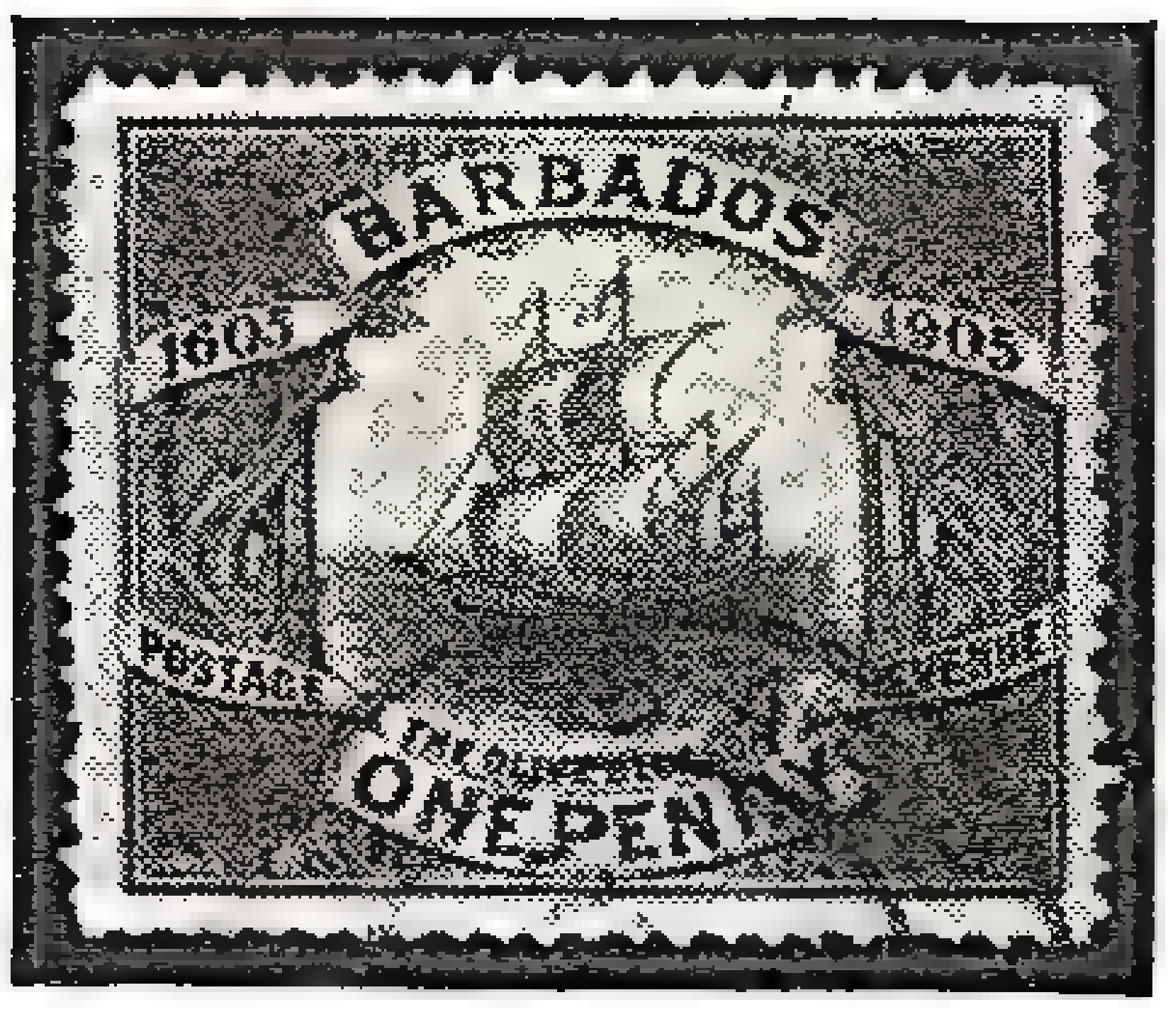


FOR years O. T. Lang, a Minneapolis architect and collector, has gathered together old watches of every imaginable type and size. Today his collection of ancient and modern timepieces of various countries is so complete that it presents an almost complete history of man's efforts to accurately tell time.

Older watches in the collection are now being put in working order by C. C. Cason,

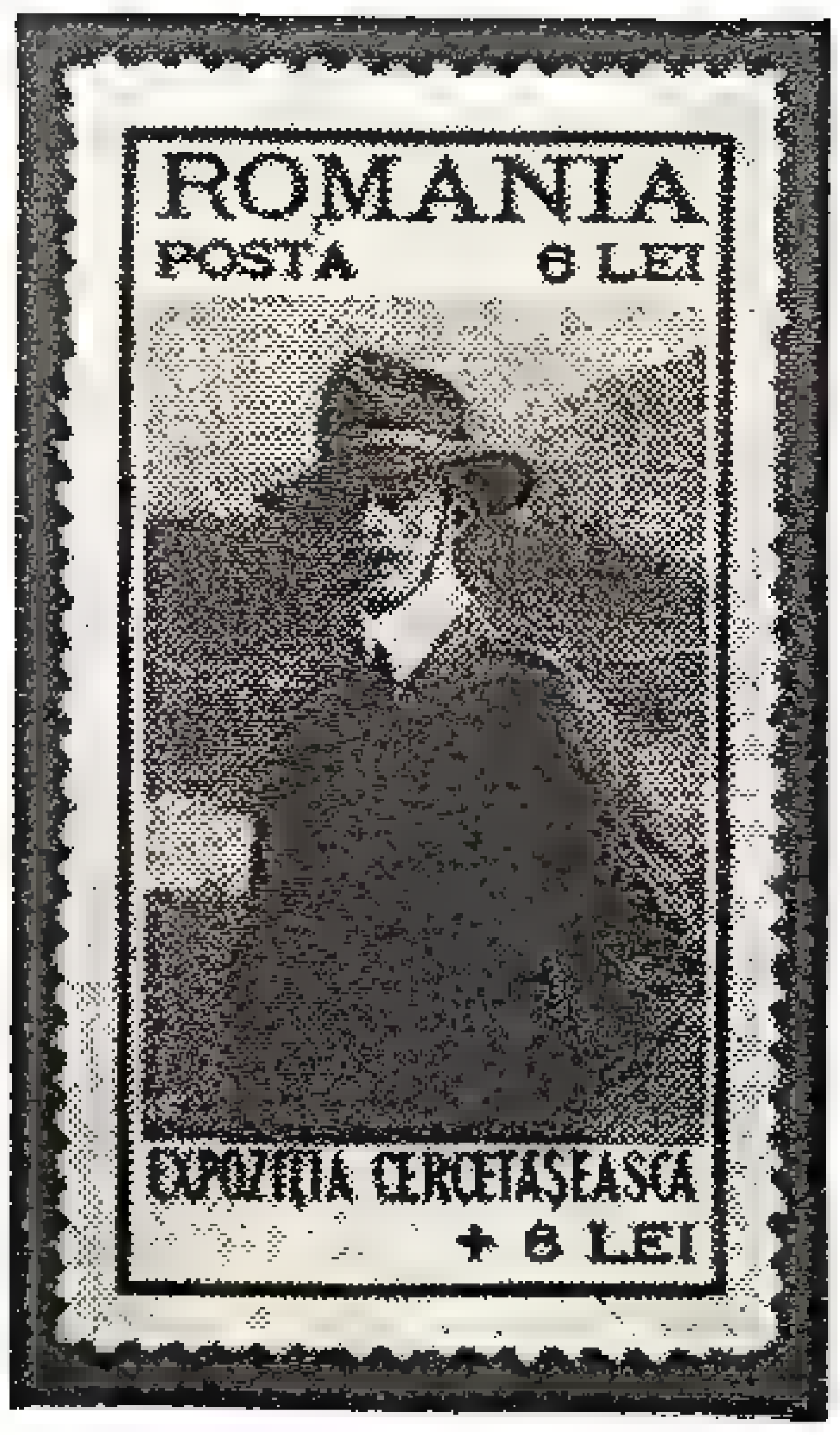
(Continued on page 116)

Barbados Ship Stamp Is Prized



THERE have been many beautifully designed and printed ship stamps, but perhaps the prettiest of them all is the one penny Barbados *Olive Blossom* stamp issued in 1905. It was way back in 1605 that the British ship *Olive Blossom* touched at this lovely West Indies isle. The crew of this ship took possession of the island in the name of James I of England.

Boy Scouts on Roumanian Stamps



THERE is one easily obtained set of stamps which every Boy Scout stamp collector should have. A complete set of stamps was put out by Roumania in 1930 to honor the Boy Scouts of that country and the world.

The 6 Lei stamp shows Prince Carol in his Boy Scout uniform. Other stamps show scouts doing "good turns."

SPORT!
SPORT!

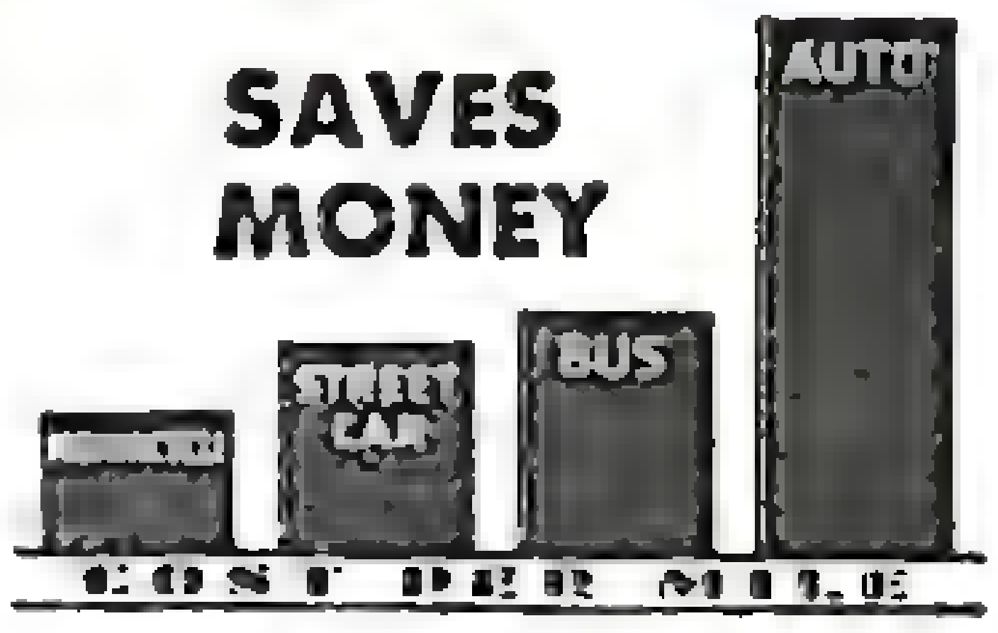
Easy to Learn

A twenty minute lesson and you're ready for the road! That's how easy it is to ride the low-swung, self-balancing, easy-to-control Harley-Davidson. Safe! Comfortable! Speedy!

THERE'S a *thrill* to motorcycling! You are master of the road — you zip through traffic, around and past the car parades — you are away and gone into the beckoning countryside — free as a bird on wing!

There are good times all the time for the motorcycle rider — club runs, tours, race meets, hillclimbs — with jolly Knights of the Highway for pals.

Get a Harley-Davidson! It's so easy to pay for — costs so little to run. Ask your Dealer about his easy payment plans — and take a demonstration ride!



One cent per mile with a Single, two cents with a Twin — normal running cost for a Harley-Davidson, and it includes everything! The savings soon pay for the motorcycle.

Ride a **HARLEY-DAVIDSON**

Mail this Coupon

Harley-Davidson Motor Co., Dept. MM, Milwaukee, Wis.

Interested in Motorcycling. Send illustrated literature. Postage Stamp is enclosed to cover cost of mailing.

Name________________

Address________________

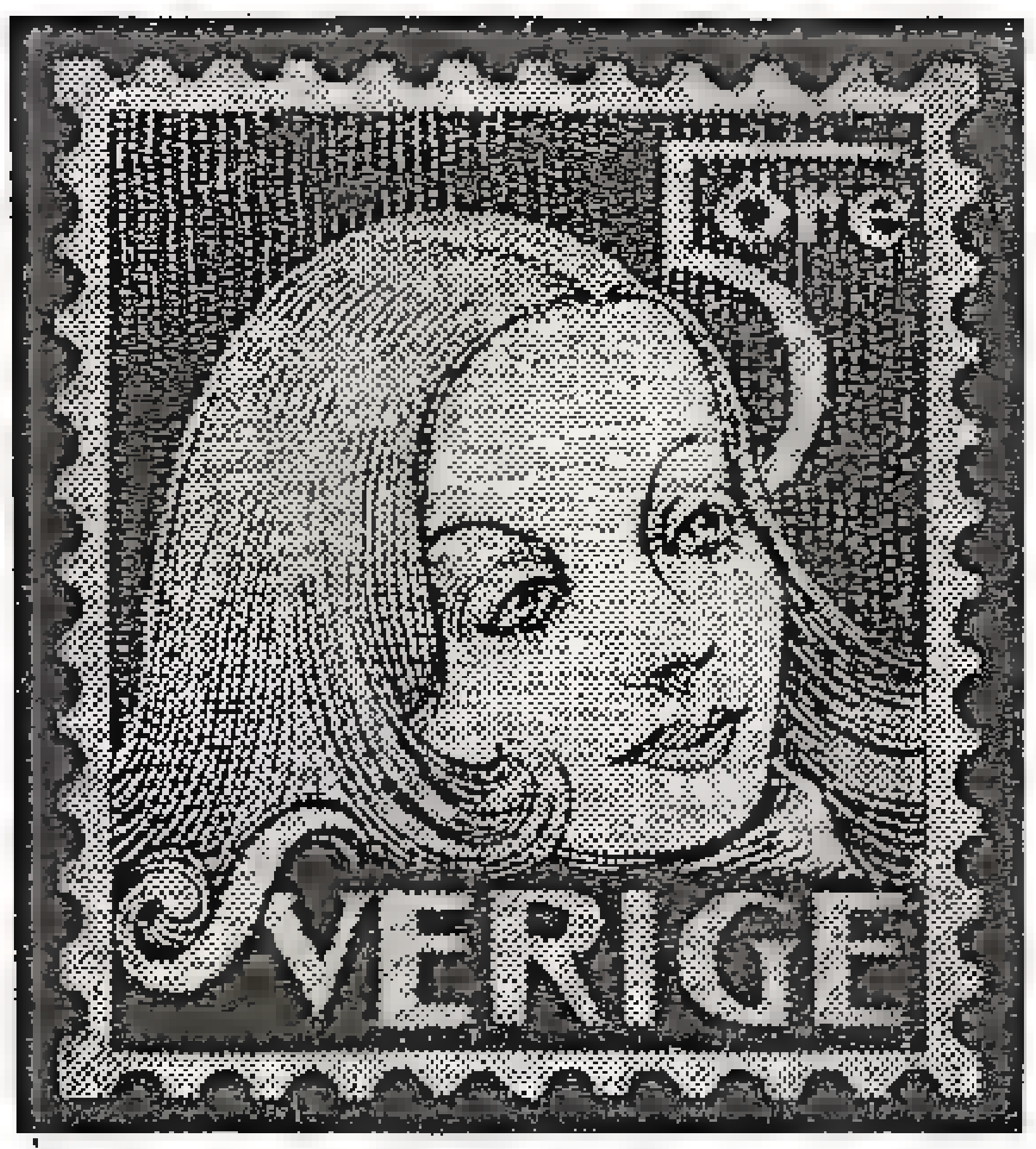
My age is ( ) 16-19 years, ( ) 20-30 years, ( ) 31 years and up. ( ) under 16 years. Check your age group.

Watches Present History of Time

(Continued from page 114)

expert Minneapolis watchmaker. Each watch is first thoroughly cleaned, then bit by bit new parts are fashioned to replace those worn or broken. New springs must in most cases be built up by hand, since replacement parts are now impossible to obtain. Even though some of the watches are hundreds of years old, they are fixed up to look and run "just as good as new."

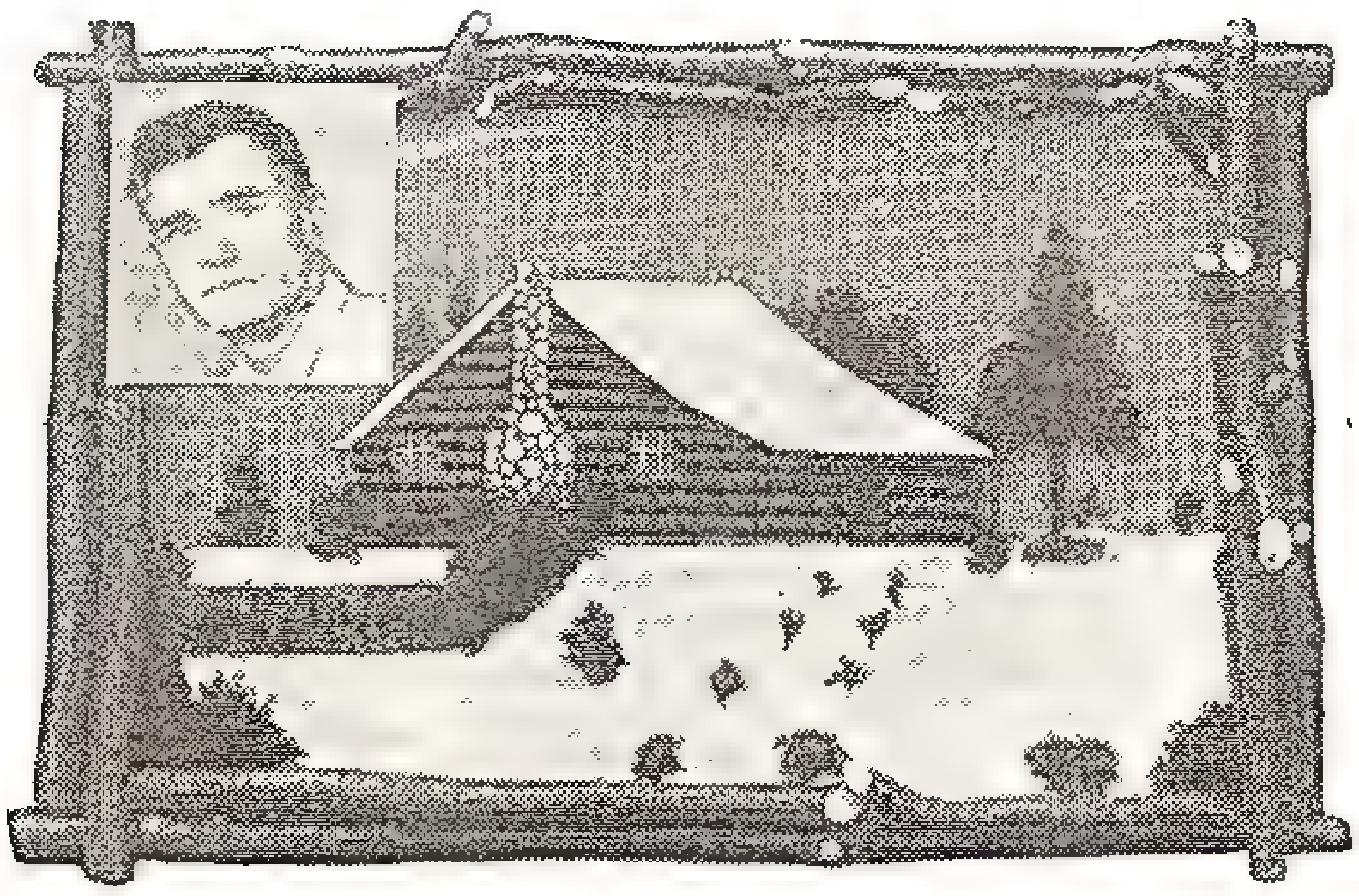
Will Sweden Issue "Garbo" Stamp?



Greta Gargo stamp design, submitted in recent Swedish newspaper contest. It is not as yet approved by postoffice officials.

IN a recent contest conducted by a Stockholm newspaper for a new Swedish postage stamp design, one contestant submitted this design bearing the likeness of Sweden's famous daughter, Greta Garbo. If the design meets with official approval, it will be issued.

Artist Makes Pictures With Twigs



One of three-dimension scenes made from twigs, bark, and forest litter. Roof and foreground are of birch bark. Inset: Woodsman-artist George Pixley, originator of new art.

TWIGS, moss, and bark are used by Michigan's woodsman-artist to make realistic three-dimension pictures having the beauty of oil paintings.

In the deft hands of George H. Pixley, of Harrison, Michigan, a wide board, a pile of forest litter, a few nails and a bit of glue change into a beautiful picture of the outdoors.

The grain of the board becomes clouds scudding across a winter sky; twigs change to a log cabin, birch bark to a snow-laden roof, and twigs of squaw pine form trees and shrubbery.

ADLETS FOR HOBBYISTS

STAMPS

ZANZIBAR! Packet queer freakish stamps from Zanzibar, Algeria, Sudan, Malay States, Victoria, Gold-coast, Nigeria, British Colonies, Souamericans. Don't delay! Don't wait. This whooping packet free for 5c postage. Gray Stampco, Dept. M.M., Toronto, Canada.

ALBUM, 4100 Spaces; 1000 hinges; 215 different foreign; 20 airmails; 25 Japan; Tweezers. All for 50c. Postpaid. Approvals. Burtis Co., Saratoga, N. Y.

1863 LOMBARDY-VENETIA, Charkhari, Turks Caicos Islands, $5 U. S. Afghanistan, genuine Baden, and Imperforate Byrd—Absolutely free to approval applicants enclosing 3c postage! Viking Stamp Co., 1 Hanson Place, Brooklyn, N. Y.

PARCEL POST Set, 12 varieties, Belgian. 4c postage. Wallace, 3636 17th Avenue, Minneapolis, Minn.

500 MIXED stamps, good value 20c to Approval Applicants. Western Stamp, 121 West Second, Los Angeles, California.

RARE, Complete sets, Old South American envelope stamps only 10c to serious collectors. Fred Walker, 627 South Olive Street, Los Angeles, California.

COLOSSAL Packet of Canada and other British Colonials, including commemoratives and pictorials only 10c to applicants for super-foreign approvals, economically priced. Swalley Stamp Service, 1119 Trenton, Los Angeles, California.

SENSATION Packet: Coreas, Liberia, triangles, British Colonials 10c. A. Steele, Springdale, Pa.

CHOOSE your premiums! Jungle Stamps! Animal! Bird! Airmail! Triangle and Map stamps! Pick any ten from our big approval selections. Inclose 5c postage. Stamp Importers, Akron, Ohio.

FREE! Three Spain Airmails or Russia Ethnographic Issue. Postage 3c. Roberts, 901T Fourth, Bay City, Michigan.

FREE—To approval applicants. Five beautiful airmails from five different countries. C. A. Green & Co., Norwood, Ohio.

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AIR MAILS—From Brazil, Chile, Colombia, Ecuador and Mexico, all for only 10c with our double premium penny approvals. Progress Stamp Service, Franklin Park, Illinois.

MAMMOTH Mystery packet of rare stamps for only 10c to serious approval applicants, also valuable free premiums with every selection afterwards. Our stamps are better and our service is different. Fair-Play Stamp Service, 1215 Browning Blvd., Los Angeles, California.

RARE Eight-sided stamp included in "Surprise Packet" only 10c with startling double premium approvals. Bargain Stamp Service, 1330 South Hope Street, Los Angeles, California.

HIGHEST Cash prices paid for your stamps. Doake, Fresno, Ohio.

STAMPS! 100 diff. 2c; 500 diff. 35c; 1,000 diff. 90c. Tatham Stampco, D9, West Springfield, Massachusetts.

STAMPS Sent on approval. 50% discount. Fred Herzberg, 197 Grantley Ave., Elmhurst, Illinois.

COINS

OLD MONEY Wanted. $5.00 to $2,500.00 each paid for old coins. Buying catalog 10c. Robert Cohen, Box 483, Muskogee, Okla.

COINS, California gold quarter size 27c; $½ size, 53c. 3c piece and coin catalogue, 10c. 200 different stamps and stamp catalogue, 10c. Norman Shultz, Salt Lake City, Utah.

$5 to $500 EACH paid for Old Coins. Keep all old money. Get posted at once. Send 10 cents for Illustrated Coin Value Book 4x6. Guaranteed Buying and Selling Prices. Coin Exchange, Box 17, Le Roy, N. Y.

HIGHEST prices paid for Indian Head pennies. Send dime for list of those wanted. Coin Shoppe, Box 407-MM, Ottawa, Ill.

30 DIFFERENT U. S. stamps and list of prices paid for all Indian Head Pennies 10c. Coin Shop, 2422 Reid St., Flint, Michigan.

LEARN *in Los Angeles*

AUTOS-DIESELS

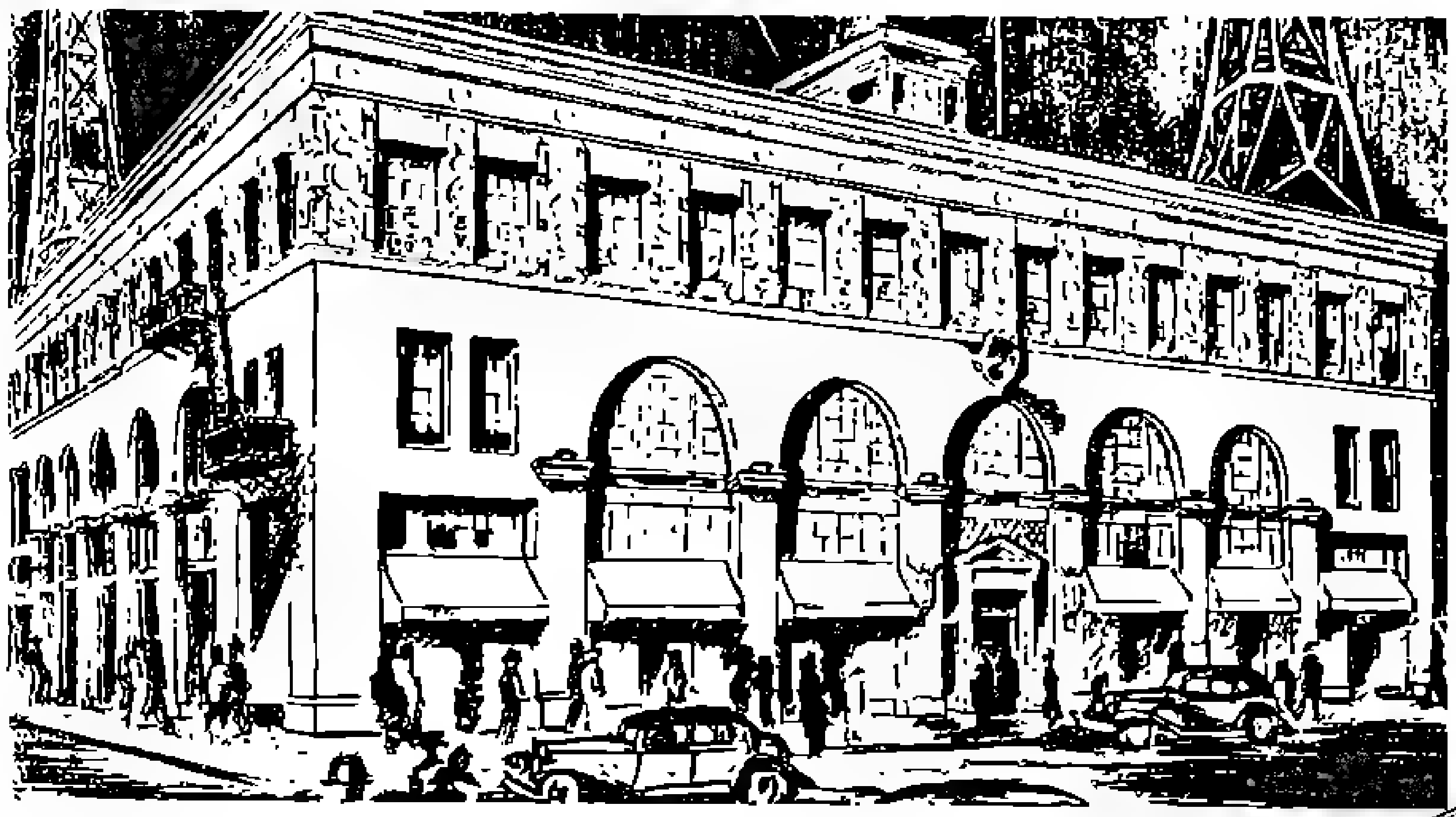
The opportunity of a life-time awaits you. High-speed Diesels are being rapidly developed for service in trucks, tractors, boats, airplanes, streamlined trains, power-shovels, etc. Trained men are needed. The demand is increasing every month. But the expert operator and repairman must first become trained. He must be master of all branches of auto-repairing; otherwise he cannot qualify. National Automotive School trains you in both trades—AUTOS and HIGH-SPEED DIESELS. You learn Autos and you learn Diesels, hand-in-hand, by practical shop methods under working conditions identical to actual shop practice. Expert instructors teach you individually.

GREATER OPPORTUNITY THAN EVER BEFORE FOR TRAINED MEN TO OBTAIN GOOD JOBS

Now, for the first time in history, you can obtain training in Auto and Diesel work simultaneously. National instructors have devoted two years to the development of our new High-speed Diesel Course as an added course. When you graduate after a few months of delightful training, you will be qualified to accept a dependable position anywhere. National is the only institution offering complete Auto and Diesel instruction.

You can qualify FOR THESE GOOD JOBS

AUTO	DIESEL
Auto Mechanic	Diesel Mechanic
Auto Electrician	Fuel Injection Expert
Battery Expert	Diesel Service Man
Carburetor Expert	Machinist



A MILLION-DOLLAR SCHOOL TO TRAIN YOU BY PROVEN METHODS

This magnificent institution points with pride to a record of more than 30,000 successful graduates. It is the largest trade school in Western America. National's students are sought by many corporations and employers of trained men. You not only receive complete training, but are given an unlimited scholarship, permitting you to return to the school later for additional instruction if needed. Los Angeles is the ideal place in which to train. Many delightful trips to points of scenic interest, movie studios, also fishing, mountain hiking and other recreations are arranged by the student body. Enjoy fall and winter in Sunny California.

ESTABLISHED 29 YEARS AGO

National Automotive School was established in 1905, being the oldest trade school in the West. The faculty is comprised of experienced instructors who are practical men. No tiresome text books are used. Practically the entire training is comprised of delightful shop practice under the watchful eyes of instructors, who teach you, step by step, how to master the Auto and High-speed Diesel trades.

SPECIAL OFFER—RAILROAD FARE ALLOWED

No matter how far from Los Angeles you reside, the cost of enrolling is as low as if you lived in California. For a limited time, National will continue to allow coach railroad fare from any part of the United States to Los Angeles. You will be credited the amount of the fare against the cost of tuition. This offer will be continued despite the fact that the new and enlarged High-speed Diesel Engine Course is being offered for a limited time, including Auto Training, at no extra cost. Only a limited number of students can be accepted under this special offer. We therefore suggest that you immediately request full details. Simply send the coupon and you will receive the interesting illustrated catalog and full details about the High-speed Diesel and Auto Courses.

NATIONAL AUTOMOTIVE SCHOOL
Practical Training in Gasoline and High Speed Diesel Engineering
4006 So. Figueroa St., Los Angeles, Calif.

NEW COURSES--*NO increase in cost* for High-speed Diesel Instruction

For a limited time, National offers the complete course in High-speed Diesel Engine Training to all students enrolling for automotive training. In other words, you receive two courses for the price of the auto course. This offer is limited and may be withdrawn at any time. The High-speed Diesel Course includes complete instruction in all branches, including theory, design, construction, repair and operation.

The Auto Course includes instruction in every branch of auto training, enabling you to operate your own shop. This is the most complete High-speed Diesel and Auto Course offered anywhere in America.

MAIL COUPON FREE Book

Your Opportunity in the AUTO-DIESEL INDUSTRY

EARN ROOM AND BOARD while learning

The majority of our students earn their room and board while learning. This enables those with limited finances to enroll and obtain training at a cost within their reach. We assist students in obtaining part-time jobs. Full details upon request.

MEN OF ALL AGES CAN ENROLL

Don't worry about previous experience or whether you are too old or too young. You can train under our successful methods if you are ambitious to obtain the right kind of experience and instruction for a good-pay job. You can take as long as you desire to complete the course.

FREE EMPLOYMENT HELP

Upon graduation, we assist students in making contacts for good-pay jobs and have placed hundreds of our students. The National diploma is a certification of your ability and helps place you at the head of the list for employment. Our graduates are located in all parts of the country and we shall be pleased to refer you to such students in your locality.

REQUEST FOR CATALOG

National Automotive School,
Dept. MMA-8, 4006 So. Figueroa St.,
Los Angeles, Calif.

Without obligation, please send full details and your illustrated descriptive catalog giving information about your school and courses in Auto and High-speed Diesels.

Name ....

Address ....

City .... State............

MECHANICAL ENGINEERING

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Fireworks Magician Tames Dynamite

(*Continued from page 42*)

"There are only about 200 really professional fireworks shooters in the United States. Sometimes the green helper is more bother than he's worth. Down in Birmingham, Ala., one year, I got two negroes to help me set up a show and hired them to stay for the shooting. Night came and the hour for the fireworks. I touched off the first piece, a set of fast-burning, spark-shooting pinwheels. My trusty aids got into the spirit of the thing immediately. The last I saw of them, they were vanishing into the night at top speed.

A Fireworks Flight With Ruth Law

"Things are always happening to break the routine and that's an additional reason why the work is interesting. I was on a job at Avoca, Iowa, in 1917. I had been in the business just three years. I felt I knew a lot but I got a new idea on this angle and found there was lots to learn. Ruth Law, the famous aviatrix, was there, giving a flying exhibition. She decided to make a night flight with fireworks flaring from her plane, the first time she had attempted such a stunt.

"I attached the fireworks to the wings of her plane, one of those old-type pushers with the engine behind and the seat out in front. The pieces were to be fired by electric squibs connected in series to the plane's magneto.

" 'Want to go along?' she called to me. 'I may need some help firing this stuff.'

"I looked at the plane. There didn't seem to be much accommodation for passengers.

" 'Just hop on the wing there and you'll be all right,' said Ruth. She was getting impatient. The old engine was chugging away behind and the crowds were waiting.

"I doubt if I would do it today, but I hopped on as fast as I could, tickled to go up with Ruth. I straddled all the wires and other supports I could drape myself around, dug my fingernails into a strut and away we went, into the black night with the lights of Avoca and its fair falling away below us.

The Dangers of Flying Fireworks

"I didn't have any time to think about the flight. The fireworks kept me busy. We fired 'em all right but I was worried about the flares. Would they fire all right or would they set the wings ablaze? I had all the confidence in the world in Ruth's flying ability, but I didn't know whether or not the fireworks would bother her. The glare and extra wing weight might prove disturbing.

"Everything went splendidly, however. In fifteen of the most absorbing minutes I have ever spent, we were back on the field and the crowd was giving Ruth a big hand. And she deserved it. The stunt sounds rather tame now. Fireworks from a plane are an old story and we know a lot more about attaching them and firing them properly. But these were early days in aviation and flying fireworks were a distinct novelty. Ruth Law proved that night as she did many times before and since that she was a real sportswoman and not afraid of anything."

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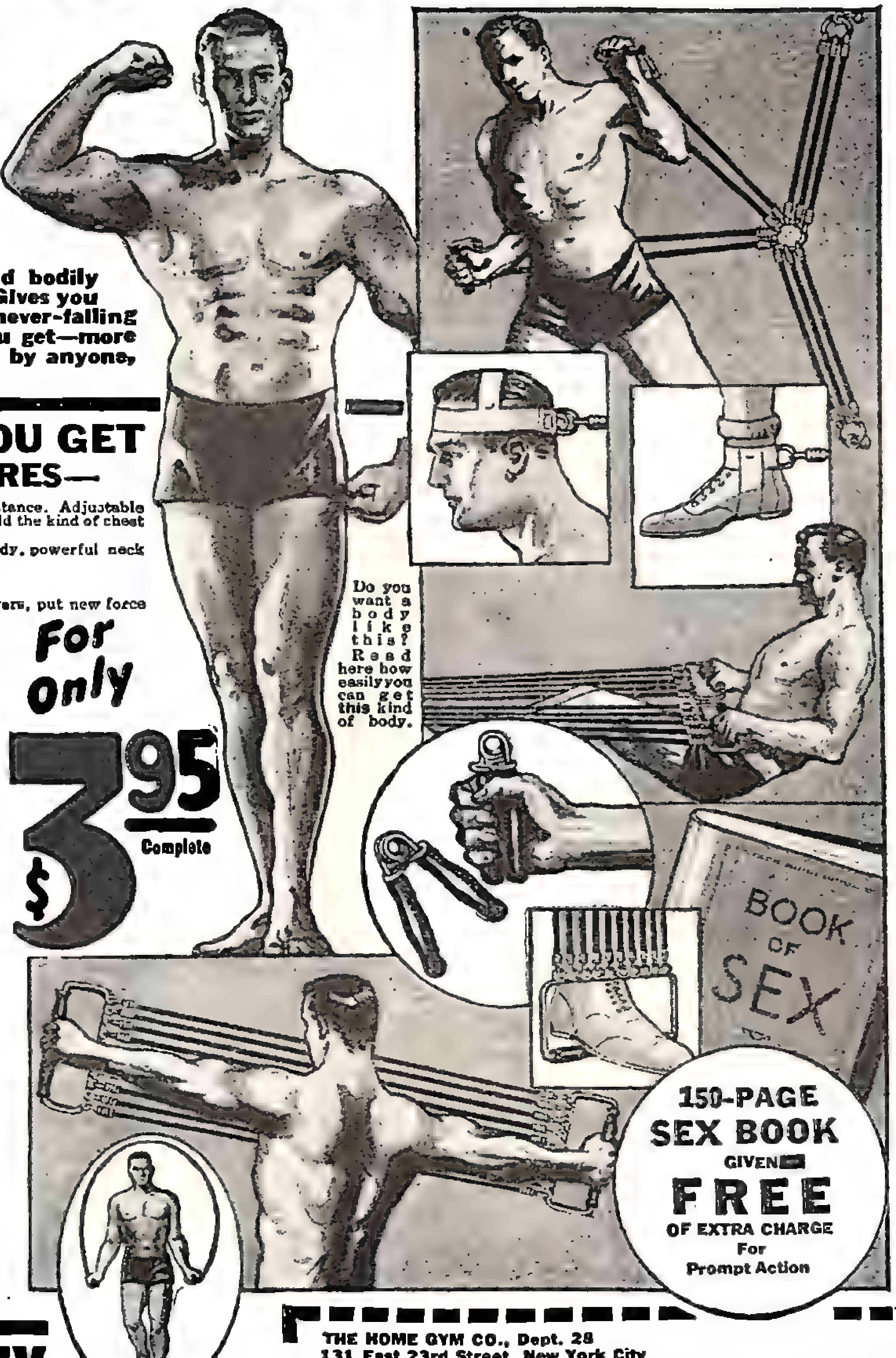

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Riding Motor Broncos to Victory

(Continued from page 47)

latter event, nothing happens; but if too much power pours through the rear-wheel—look out.

One rider, bounding up the Jackson, Michigan, hill lost control through having too much power, ran off the narrow course and plowed through a soft drink stand.

To avoid similar accidents I carry several sprockets with me, which may be fitted quickly to the rear wheel. Each gives me a different gear ratio. I use one sprocket with a gear ratio of 10½ to 1 on a hard-surfaced, not-too-steep hill, which calls for plenty of speed. I use an 11 to 1 sprocket on an easy hill with soft covering. A third sprocket gives me a ratio of 11½ to 1 which delivers power rather than speed on an unusually steep grade.

There's little danger of a motor getting away from its rider with power on nowadays. These engines turn up 6000 r.p.m. but they cut off automatically. A spring cut-out on the handle contacts to short the motor whenever a rider leaves the seat. A leather strap fixed to his wrist pulls out the wedge.

We will have many thrills—and chills—as the season progresses, but none more spine tingling than the National Championship in September. Last year I won it at Bethlehem, Pennsylvania.

For eight years many riders tried to top this 625-foot hill but I was fortunate to be the first over in 1928. My time was 12.5 seconds. This is a long, steep 76 percent grade, with a rock ledge 400 feet from the bottom. We must jump the ledge—or else.

All championship events are run under sanction of the American Motorcycle Association. But you can have just as many thrills on neighborhood hills—if you will remember these four points: (1) Use chains. (2) Provide automatic cutout. (3) Adjust the carburetor properly. (4) Select a proper gear ratio for steeper hills.

Diesel Power Brings New Speed Era

(Continued from page 81)

operation with speeds of over 60 m.p.h.

In this country Diesel truck-trailer trains are averaging ten miles to the gallon of fuel oil—a new record for low-cost freight transportation.

A Diesel-engined bus sped from New York to Los Angeles in 91 hours, burning only $21.90 worth of fuel oil. A Diesel-powered racing auto finished the gruelling 500-mile Indianapolis speedway race without stopping once for fuel or repairs, making an average speed of 86.17 m.p.h. It was the first car to complete the race without a stop.

The new Diesel has been reduced in size just as much as it has been increased in power. The smaller units are bringing unheard-of economies of operation to owners of both pleasure and commercial cruisers.

Are You Fit to Drive an Automobile?

(Continued from page 59)

that a field of less than 140 degrees is dangerous for the motorist.

Serious crashes await the driver who lacks depth perception. A motorist thus afflicted cannot see depth or distance.

Many people are right or left eyed just as they are right or left handed, although few of them know it.

To test for this failing, Dr. Lauer uses a metal instrument shaped like a flattened cone. The driver looks with both eyes through the large end while the examiner moves a pencil back and forth at the other end. The driver is required to focus on the pencil. If he does this to the right of a center sight on the instrument, his left eye is dominant and vice versa.

Dr. Lauer uses what is known as a "glare-ometer" to test the driver's resistance to sun and headlight glare. The instrument consists of a light behind a circular, frosted glass and a diffusing lens. In the center of the glass is the word "out" printed plainly on a white background which is impervious to light. As the intensity of the light is increased the probationer is required to say "out" when the word goes out to him.

The Ishihara test is used for color blindness. This consists of a series of circular areas made up of colored dots so arranged that one numeral is read by the normal eye while another is seen by the person suffering from color blindness. Ten per cent of men and one per cent of women drivers are blind to this combination of colors.

Following the examination of vision the driver's strength of grip is tested, an important test because of the power required to hold a car in the road in case of a blowout.

Staging a Championship Fight

(Continued from page 51)

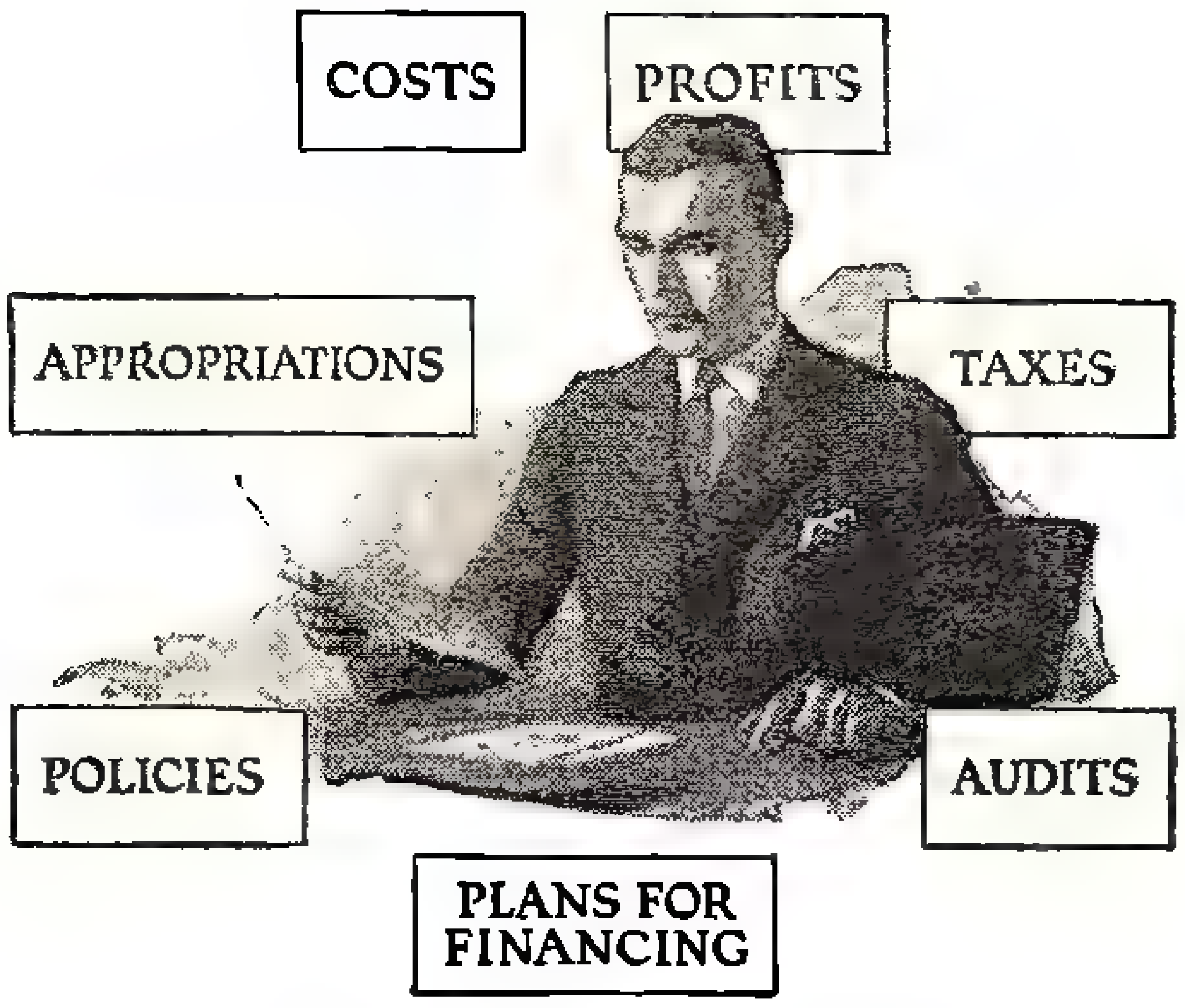
65,000 to 72,000 for the Carnera-Baer fight.

A staff of more than 1,500 persons is required at the Bowl during a mammoth show such as the heavyweight championship fight. From these are selected 150 special policemen, 450 ushers, and 150 laborers and technicians. Ticket-takers and supervisors number 250. Five hundred policemen from New York City Police Department are needed.

Colonel John Reed Kilpatrick, president of the Madison Square Garden, said:

"It is the serious problem every promoter faces in a big outdoor event, that of managing the vast multitudes of varying degrees of excitement and anxiety. As I see it, the solution is in building a human barrier.

"And I don't mean one of ushers and policemen, but capacity rows up front, so there will be no vacancies to rush into. I mean we've got to guess closely how many seats we will sell in each section and grade the first row of a lower price immediately behind the higher price. Pack 'em closer, that's the idea."



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Build "Aloha"—Trailer de Luxe

(Continued from page 111)

close the method of plotting this curve. Plotting should be done on a large sheet of wrapping paper to form a full size pattern. We then lay this pattern on a level floor. Strips of plywood ⅜" thick, 6" wide and as long as the curves will permit are then laid over the curves of the pattern end to end. Make good butt joints where the ends meet. Cover the upper faces of these pieces with a generous coat of water-proof glue and lay on another layer of veneer or plywood. Repeat this procedure until three layers are in place.

Joining Ribs and Truss Member

Mark off the points where the ribs join the truss member and with one inch brads nail the assembly together. After the glue has dried thoroughly, transfer the curves from the pattern to the rough truss thus formed and cut along the lines drawn. Short lengths of white oak cut to shape and spliced together can also be used for this truss piece.

The ribs are cut from plywood ½" thick and 2" deep, and are cut from the same curve pattern. It will be noted that the fore and after ends of the truss terminate in curves of 9" radius. Continue the 9" arc 3" longer than is required for the truss.

The next job is the framing of the windows. The inside edges of the sills are cut in a straight line while the outside edges take the curve of the body. There is sufficient space between the sills to pass ¼" glass freely.

Our next step is to lay in the flooring. First cut strips of wood one inch square, as long as necessary, and bolt them to the angle iron joists using ⅛" stove bolts for the purpose. Lay ½" plywood on these joists and fit carefully around the studs. Line the inside of the wheel wells with 24 gauge sheet metal and apply two coats of red lead.

To get an apparently seamless job for the sheet metal sides of "Aloha," the following instructions should be followed carefully. The butted joints of all metal siding which in this case is 20 gauge sheet metal are set in cement, the proportions and mixing of which is as follows. To 8 pounds glaziers putty add 1 pound dry litharge and 1 pound dry red lead. Mix this to a stiff consistency with boiled linseed oil. Do not overlap the metal in tacking it down with the smallest nails possible. Spread cement on the stud faces before tacking. Before the cement begins to set, scrape off superfluous material until the seams are smooth.

Cover Roof With Mesh Wire

The entire roof is covered with ½" mesh wire, shaped to the curves of thin battens nailed to the ribs. Cover the wire mesh with padding and then proceed to cut and fit the fabric top pieces which are tacked temporarily in place. Chalk marks are then made where the seams occur and the whole thing then pulled off and sewed together. Replacing the finished fabric, it is pulled and stretched and tacked permanently after which the drip molding is tacked in place.

(Continued on page 127)

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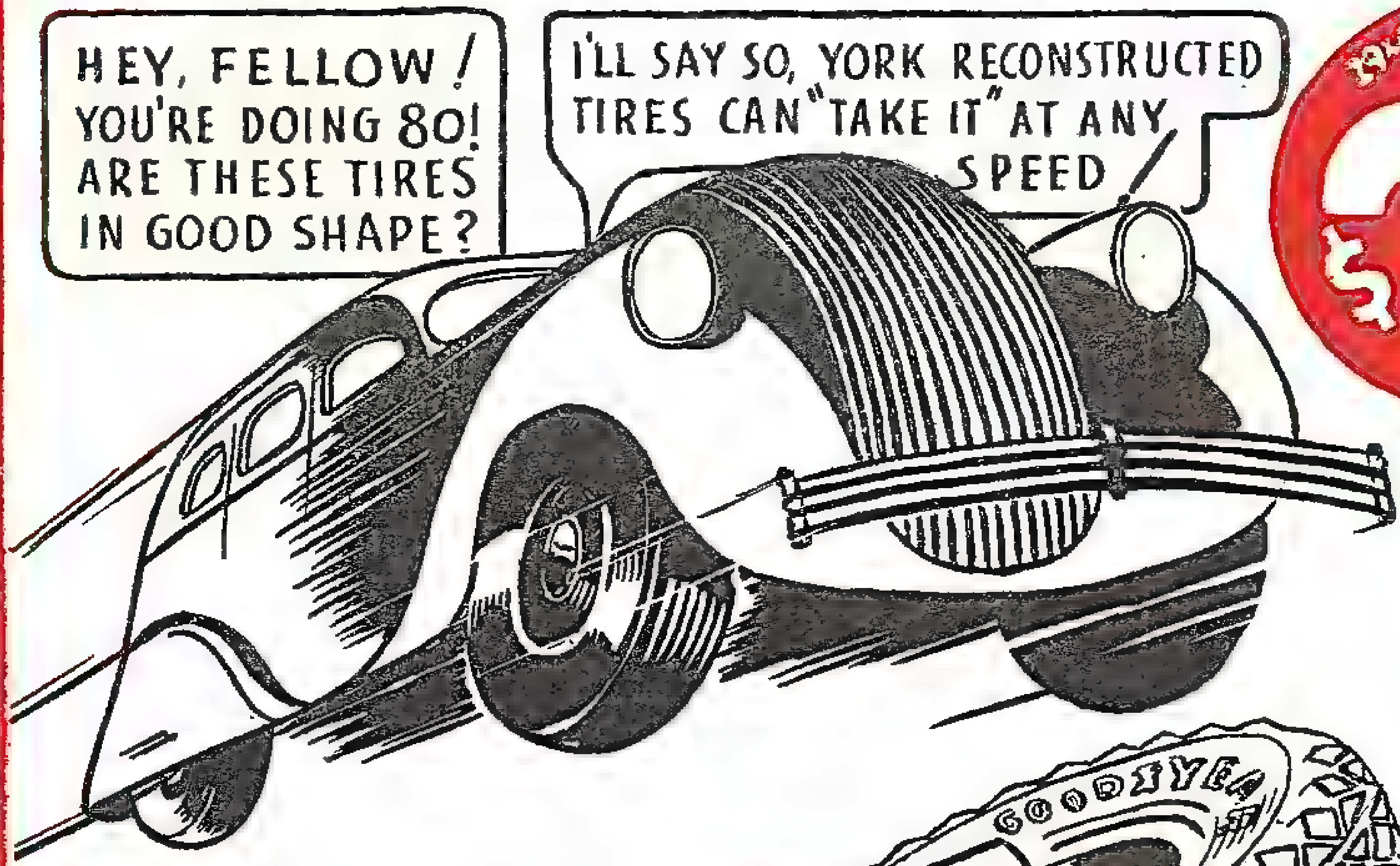

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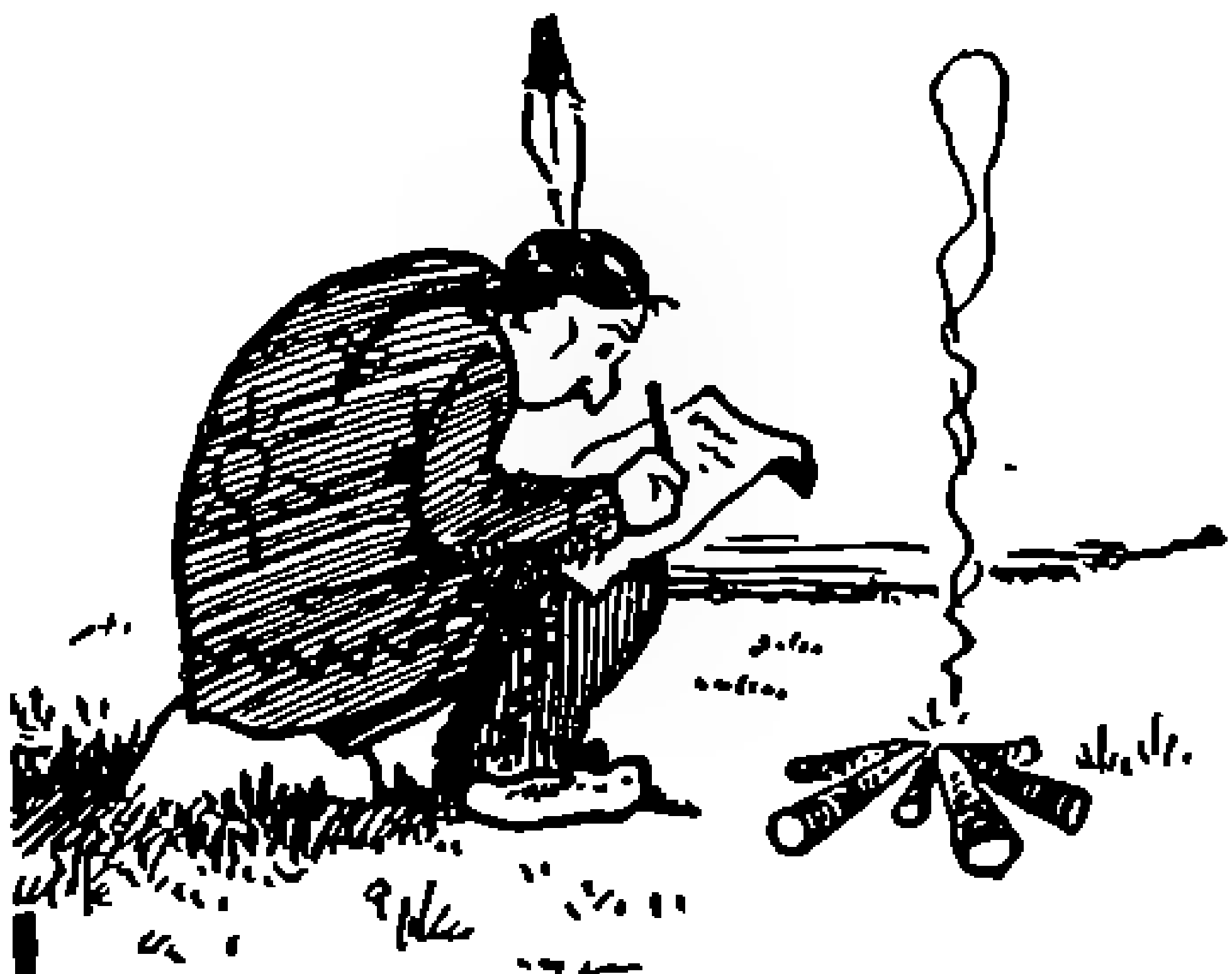

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Carnival Racketeers Fleece the Public

(Continued from page 73)

Regardless of the type of bottom, the buckets are all operated in a similar manner. The turn of a screw in the control room acts upon movable ball bearings in the central leg of the tripod supporting the bucket. This central leg is hollow. As the ball bearings are forced upward by the pressure of the screw, they in turn act upon a rod or spring which raises or lowers the bottom of the bucket, or exerts an upward pressure on the tautening ring as the case may be.

Secrets of the "Bottle" Game

The human desire to knock balanced things over, the "chip on the shoulder" complex, is capitalized upon in the "milk bottle pyramid" game. But even though stakes are small in this game, the owners aren't taking any chances. The wooden milk bottles are arranged in a pyramid of 3, 2 and 1. All the bottles, however, are not made entirely of wood. One is weighted at the base. If the weighted bottle is in the bottom row—where it usually is—the player is wasting both his time and money.

These games all produce a goodly revenue, but the "big time" in the carnival fleecing business is represented by the "wheels of chance." Two types of roulettes are used.

The Percentage Wheel is the common type mounted on the "wall" of the stand. Numbers painted on the wheel coincide with a numbered board. A pointer buzzes against the nails of the spinning roulette, indicating the winner when the wheel stops.

Apparently above suspicion, the Percentage Wheel is actually geared with a cleverly constructed mechanism which causes the wheel to repeat on a certain series of numbers. The predetermined movement of the wheel is known to the "shields," or carnival confederates, who play the right numbers at the right time.

The G-Wheel is made of two solid parts, a framework attached to the counter by screws and a revolving steel arrow centered on a spindle which rests, in turn, on a movable glass base laid upon the counter.

Mechanics of the G-Wheel

In mounting the G-Wheel, the operator bolts the frame to boards A and C with the spindle resting on a piece of glass laid upon the center board, B. Fake nail heads make it appear that B is fastened to the same studding as A and C; but in reality B is movable and is controlled by a lever.

After the sporting onlookers have placed their bets on the various numbers, the operator spins the arrow pointer and the graft is on. As the arrow whirls, the operator depresses the lever dropping the board B until the spindle no longer contacts the glass plate. The arrow now actually *hangs upon the frame,* still spinning, but with a friction that rapidly decreases speed. By balancing the two elements of friction and "free wheeling" against each other an experienced operator is able to stop the pointer at any number.

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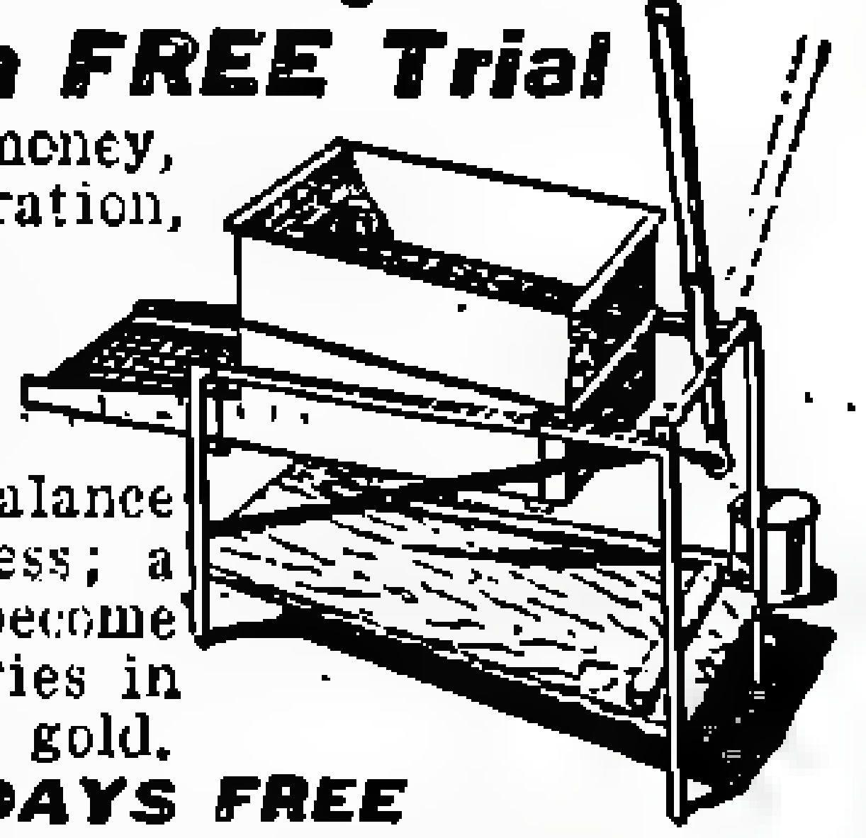

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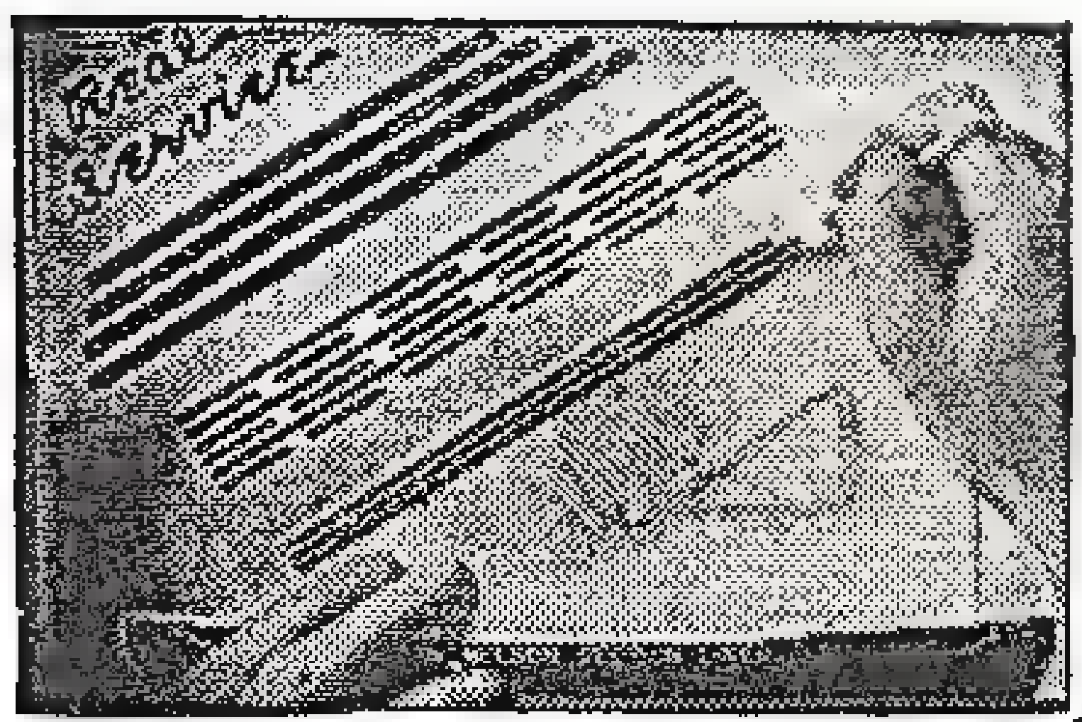

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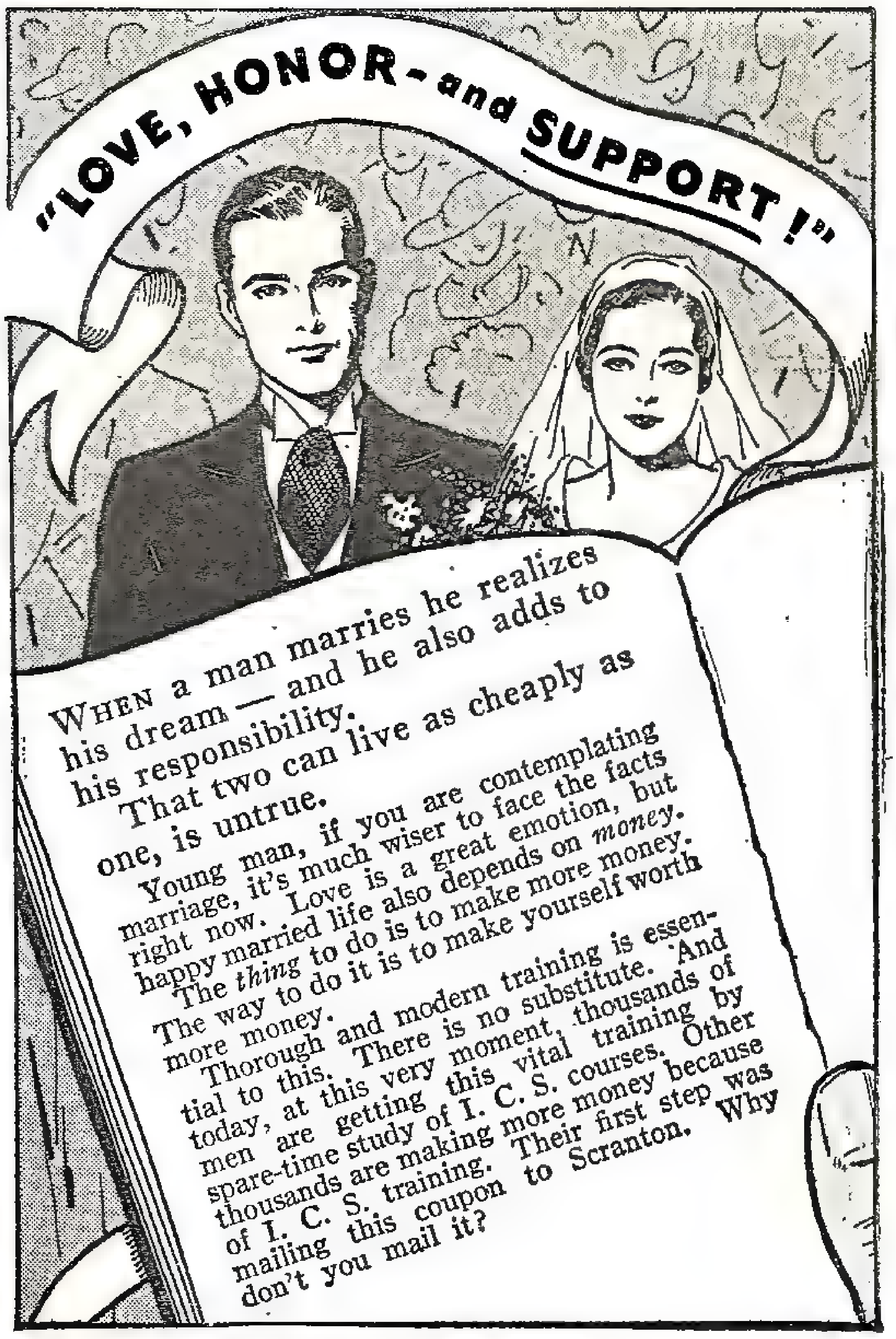
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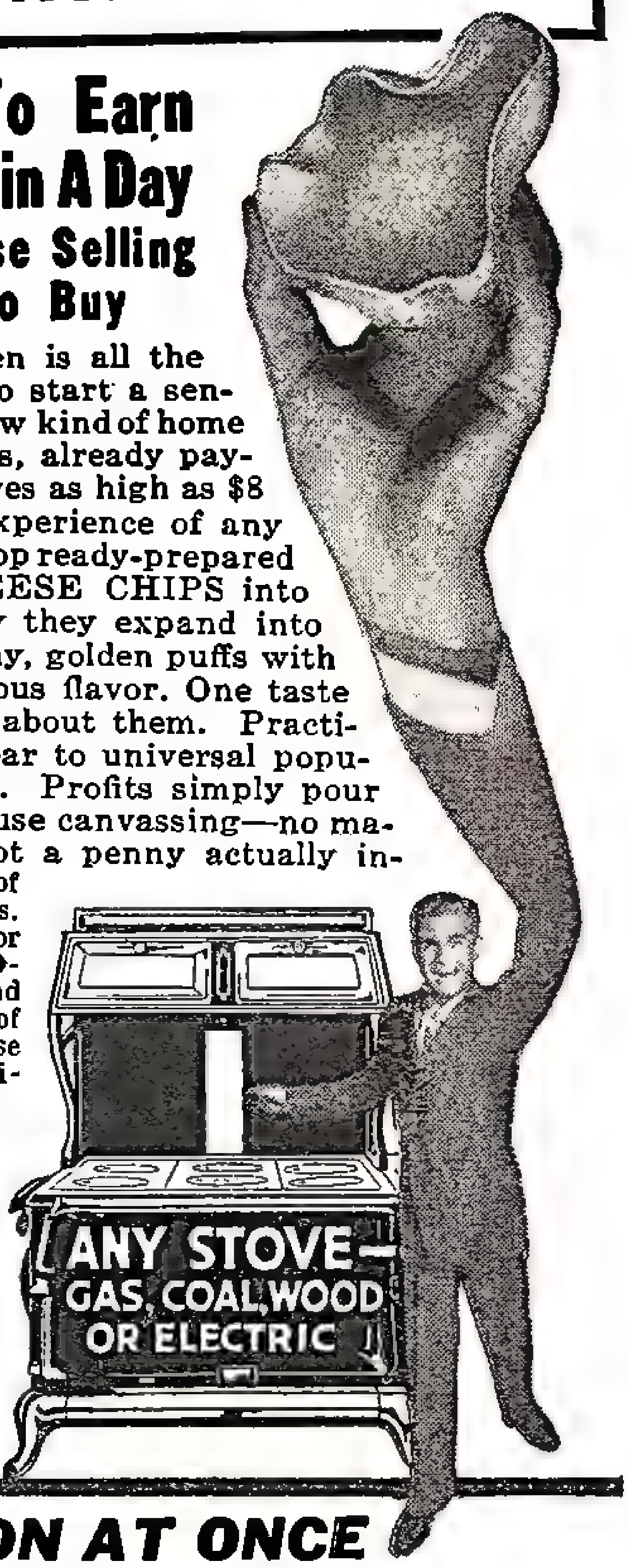

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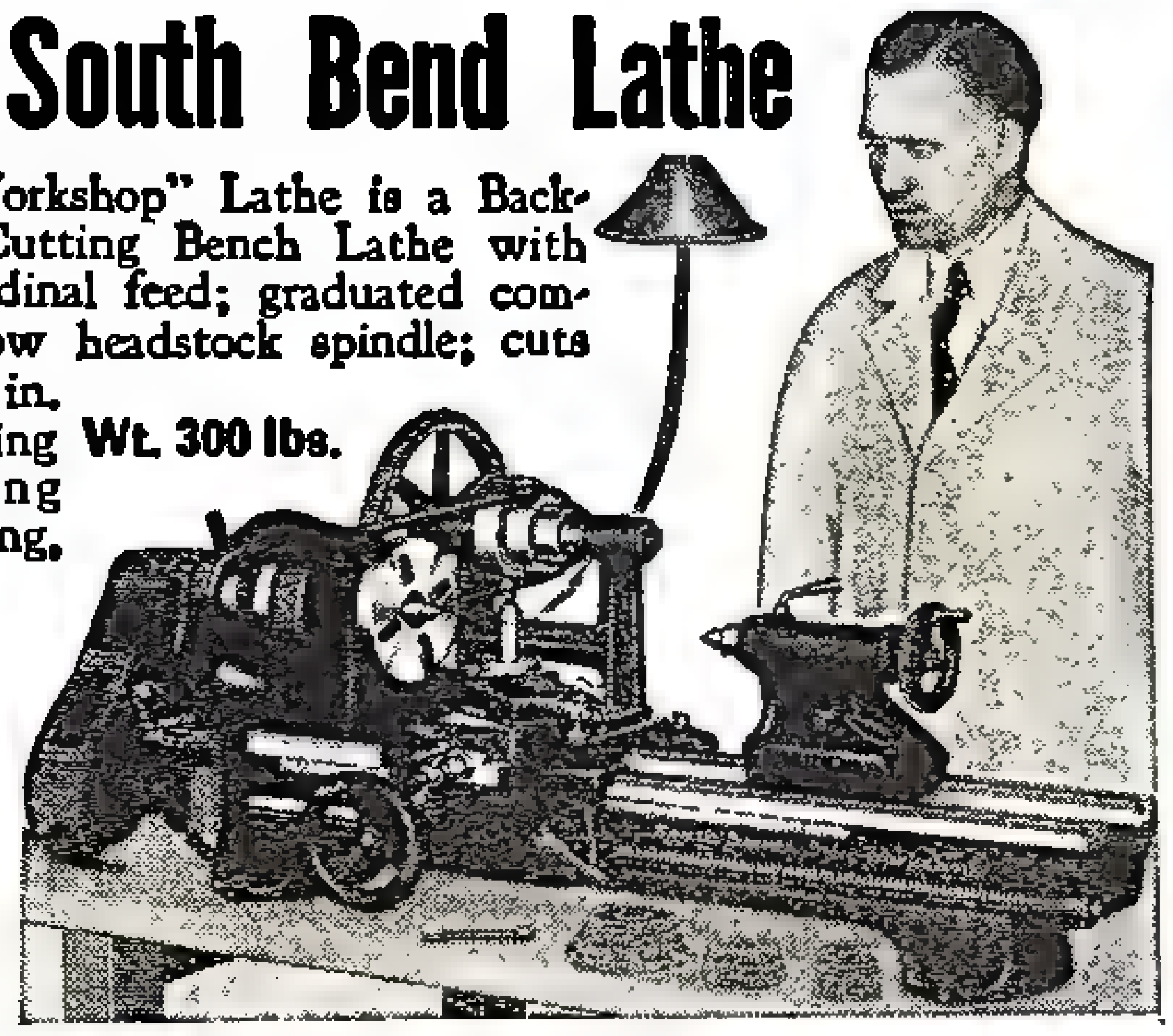

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Animated Gadgets Sway in Wind

(Continued from page 96)

the saw blade, and drill a hole for a peg to fasten the blade in the slot.

Finish with outdoor enamel paint. Make the robin's breast and lower body red, the head, back and tail dark brown. Make the saw blade and stake white or green.

The lawn goose has a laminated body consisting of a body block of ¾" stock, and two wing blocks of ⅜" stock. The head and neck are cut out of ¾" stock. These parts are shown upon the squared-off pattern. Notice that the body block is cut away to receive the lower end of the neck and the saw blade support. Cut off a saw blade to a length of 10". Saw a slot in the neck, as indicated, to receive the punched end of the blade, and drill a hole for a peg to pin the blade in the slot, as shown in the assembly detail. Drive the other end of the blade into the body slot.

After assembling, bore a ½" hole 1" deep for a dowel stick support, drive a dowel stick 12" long into the hole, and fasten it with brads.

Finish the goose with white outdoor enamel. Then paint the bill and legs red, and indicate feathers and eyes with black.

The crane's body and head are cut from ¾" stock. The neck is a hacksaw blade 13" long, the legs are ½" dowel sticks.

After cutting the body and head, and smoothing the cut edges, bore holes for the neck dowel pins, and the legs. Before assembling, paint the parts. Make the body, legs, neck and lower part of the head white, the bill and top of the head red. Indicate the tail feathers with black paint.

Flying Thrills With Captive Plane

(Continued from page 99)

metal fittings are strikingly few in number and quite simple.

Straight-grained spruce should be used for all important members. Minor members are made of any light straight-grained wood.

Any good glider (not soarer) wing section is recommended but the curve shown in the drawings will be found satisfactory for the purpose intended. Ribs are cut solid. Built-up ribs are of course lighter and can be used if the extra work and trouble is accepted.

The covering need not be high grade cloth but it should be carefully selected and doped to insure good lift.

Steel tubing will be required for the axle, the axle braces and the pyramid nose brace which forms the anchorage for the ball hitch. (This hitch is only used for the single boom coupling.)

Old motorcycle wheels can be utilized for the landing gear which is sprung with ordinary airplane shock cord, or strips of inner tube if the former is not accessible.

Aileron and other control hinges can be picked up at the junk pile or made from large screweyes. The former plan is better and safer.

Build "Aloha"—Trailer de Luxe

(Continued from page 122)

The door is built up of two pieces of plywood ½" thick and nailed and glued together.. Cut an opening 12"x15" and frame as shown in the detail. Cover the interior side with ¼" presdwood or masonite and the exterior with 20 gauge metal. Cellulose glass is used where curved windows occur.

Installing Interior Fittings

Work on the interior treatment may now be started. At this point all rough plumbing and electrical work should be installed. Automobile dome lights should be affixed to the ceiling as desired. Should the builder care to install a telephone system the April, 1934, issue of MODERN MECHANIX, page 89, illustrates a satisfactory method.

The job now is to install the shower and closet and wardrobe compartments. The shower pan is of sheet zinc 15" high with all joints well soldered. The interior walls of the shower are lined with masonite which laps the pan edges at least 2". The shower valve and head may now be installed and finished up. The shower door consists of a ½"x2" frame covered on both sides with masonite and hinged to swing in. The closet and wardrobe is formed of masonite on the exterior of frames only.

The cabinet work is next and since it already has a floor we build up the frames using ¾"x1¾" stock. All cupboard doors are of ¼" plywood. The countershelf top is of ¼" plywood covered with zinc. The sink is formed of this same material using care to see that all joints are well soldered and particularly the drain connection which leads to spill on the ground. The refrigerator is insulated with two layers of ½" celotex on the sides and four layers on the bottom. Cover sides and bottom with 26 gauge galvanized sheet metal. Provide the ice pan with a drain.

Details of the Gas Tank

It will be noted on the Longitudinal Section that there is an oil or gas tank located back of the water tanks. This is a standard automobile gas tank. Pipes for filling the tanks should run to the exterior of the cabin walls. Cover the ends with radiator caps. The type fuel used for the stove will depend on the builder's choice. Water pressure is secured by the method described in the September, 1933, issue of MODERN MECHANIX, page 96, by which the use of a hand operated tire pump forces air into the tanks, causing the water and fuel to run freely through the taps.

Blueline prints of Aloha, printed on tough white paper to stand rough handling in the workshop, are available at $2.00 postpaid. These prints contain both installments of the plans enlarged several times. Address orders to Modern Mechanix Publishing Co., 529 So. Seventh Street, Minneapolis, Minn.

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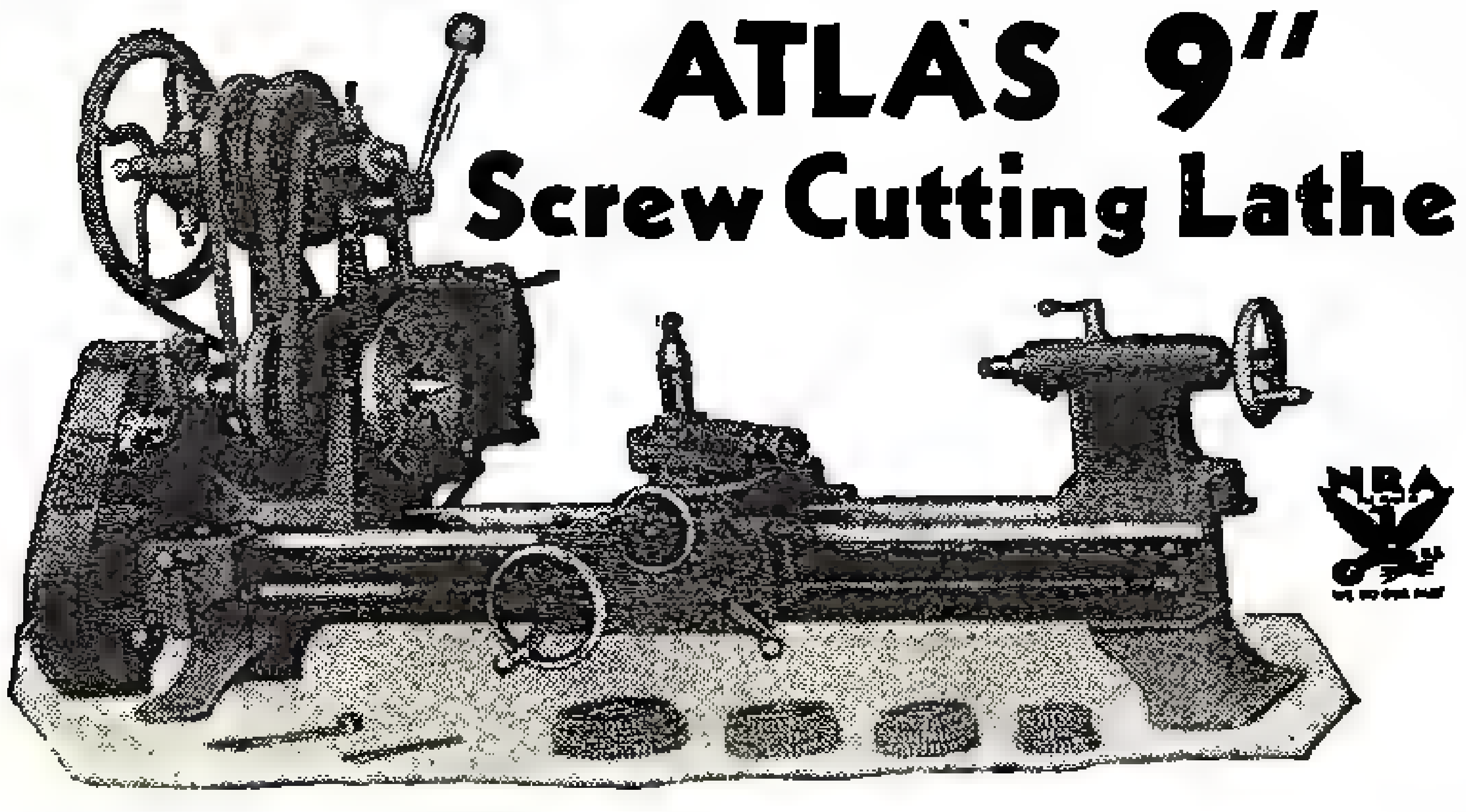

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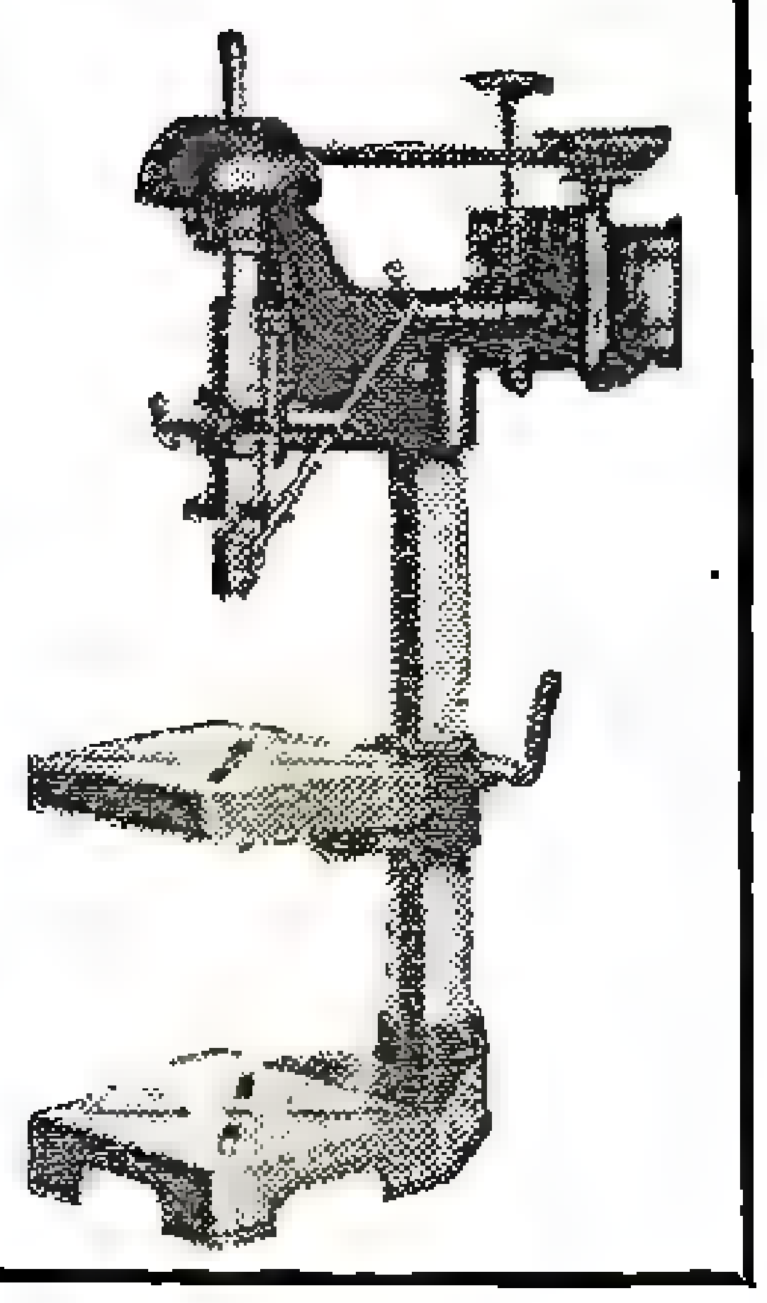

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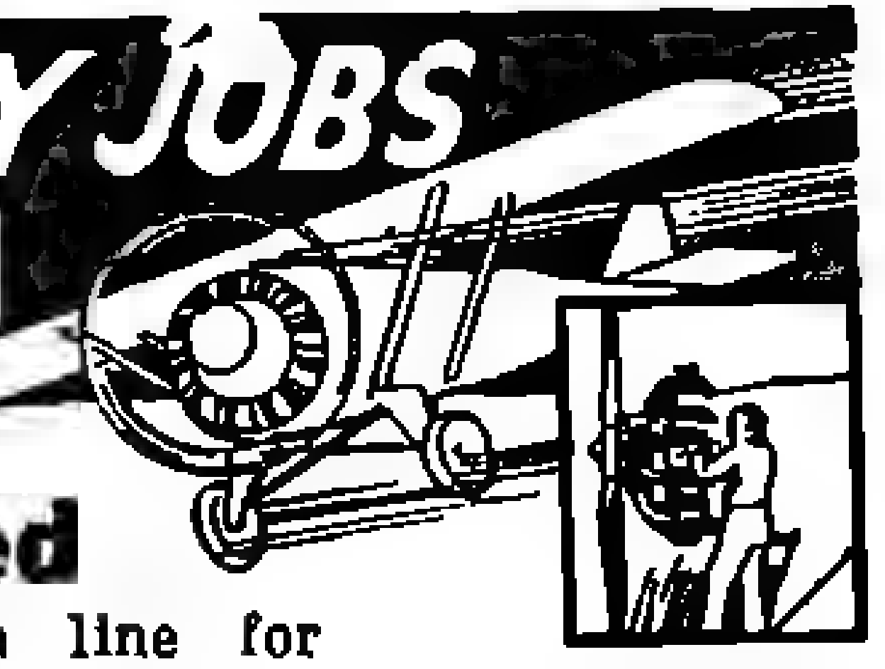

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Camper Kinks for Auto Tourists

(Continued from page 88)

three days' supply of staple groceries, well assorted.

Long straps always come in handy when tieing down the luggage. They can easily be cut out from the "furry" flaps used inside some auto tires. Buckles can be bought at any hardware store, and sewed in place.

High-top hiking boots are quite a nuisance to get into and out of. To avoid the need for withdrawing the lace from the lower eyelets, cut rubber laces from an old tube.

The air mattresses used by many campers are not at all easy to inflate with an air pump. Before camping for the night, stop at a filling station and over-inflate the spare tire. In camp just attach a rubber tube to the spare tire, using special fittings obtainable at auto supply stores, to inflate the mattress. A good tire can be inflated to double pressure without danger.

To warm up the tent on chilly days fill a pail with round stones about the size of eggs. Cover with water and bring to a boil. Pour off the water and place the pail of hot stones in the tent. They will radiate comforting warmth for several hours.

My Flight Into the Stratosphere

(Continued from page 36)

and safe as any flying. Of course, much greater speed can be attained—and therein lies the reason for stratosphere planes. The reduced density of the air will allow the "stratoplane" to travel three times faster than at ordinary altitudes.

Sealed in an airtight dowmetal ball attached to a hydrogen-filled balloon, my wife and I intend to invade the stratosphere this summer, taking off from a point somewhere near Detroit. We will take our own breathing air with us. Our balloon is built to attain an altitude of about eleven miles.

Our main interest is the study of cosmic rays. What are they? I really don't know exactly. Who of you readers knows exactly what light is? It is "electromagnetic waves," you may answer. Yes, that is right, but who can say exactly what that means?

Why does one need to go so high to study cosmic rays? It is true that these rays come down to the earth and that we can observe them here. Nevertheless, what one may observe about them near the ground is very little compared with the wealth of knowledge we hope to gain by observing them ten to twelve miles up.

As a matter of fact, scientists discovered cosmic rays near the ground. But they did not call them "cosmic" rays at that time. They believed the rays came from the earth, and were given off by the minute quantities of radium dispersed in the earth's mass.

Then it occurred to some scientists that if cosmic rays came from the ground there

(Continued on page 130)

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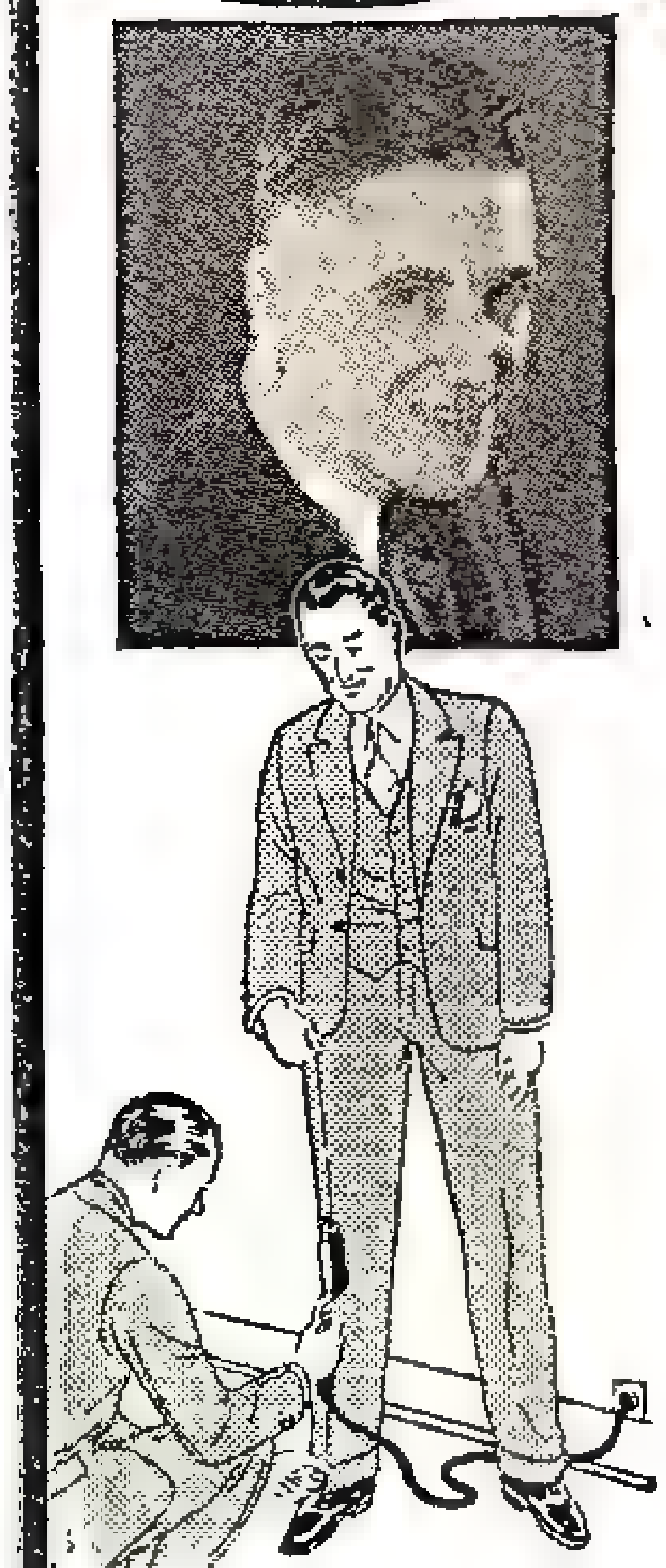

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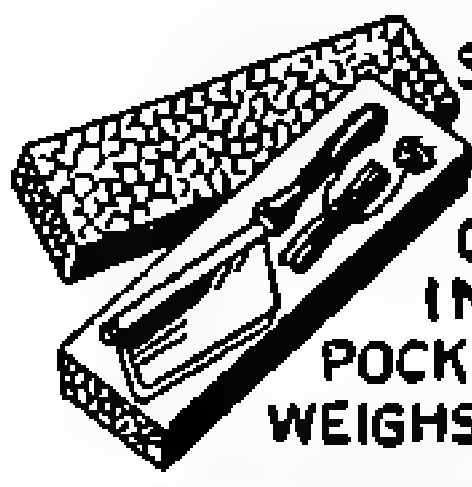

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Landing Fish With Tempting Lures

(Continued from page 87)

hair clipped to resemble a mouse. The writer uses this lifelike bait by casting it up on the grasses close to shore, then pulling it off to the surface of the water to imitate the actions of a mouse losing its footing.

Most underwater lures are heavier than floating types and are used with the bait rod.

The artificial helgramite and the crawfish are often effective for bass. Frog lures are made in many varieties, from the rubber frog with kicking legs, to the plug type with the usual frog coloration. Any of these frog lures that have their hooks protected by weed guards, so that they may be cast into the depths of the pads, to be pulled over the top of them, are really very deadly lures.

A number of bass lures that are most deadly combine both the underwater action and the top-water feature, that is to say, when the lure is not reeled it floats on the surface, when reeled, the presence of a metal collar at its head causes it to be drawn under water. Those minnows in this class that come in three sections, known as hinged minnows, are most effective. Cast to some vulnerable place and permit the minnow to lie motionless on the water, just occasionally twitching it by means of the rod tip. Like the hinged minnow, the so-called pikie minnow is very effective.

My Flight Into the Stratosphere

(Continued from page 128)

should be less of them if one went up in a balloon. They tried it. To their astonishment, there were not less, but more! They went higher and there were still more. It became apparent that the rays must come from above, from outside the earth. The Greek word "cosmos" means "universe," and that is why the rays were then named "cosmic" rays. They come from the universe.

When you go up three miles you have passed through one-half of our atmosphere—not in distance, of course, but in *mass* of air. If you go up another three miles you put one-half of the remaining air below you. That means you will have three-quarters of the air below you and one-quarter above you. If you go further up, it is always the same story: for each three miles one ascends, one puts half of the remaining atmosphere below oneself.

At ten miles, one has about nine-tenths of the air below and one-tenth above. That means that the cosmic rays, if they really do come from outside our atmosphere, will have gone through ten times less air than they have passed through when we observe them at sea level.

Are they, then, stronger at ten miles than they are on the ground? And how! Some of them are thirty times stronger. Others are even a hundred times stronger.

Then, you ask, are there different kinds of cosmic rays? Indeed there are. That is one of the confusing puzzles about these rays. And how do they look, these different kinds of cosmic rays? Well, nobody has ever seen them, and nobody ever will see them. Even the most sensitive photographic plate fails to reveal them. The only thing by which we notice their existence is the fact that they break up molecules of air. They smash the air molecules to pieces as a rifle bullet would smash a glass ball dancing on a waterspout. What we observe, then, are the bits of broken molecules in the path of these cosmic rays. To make a long story short: these fragments of air molecules make the air *electrically conductive,* and this *conductivity* of air is one of the phenomena we observe when we study cosmic rays. The higher we go the greater is the conductivity of the air.

Problems of the Cosmic Ray

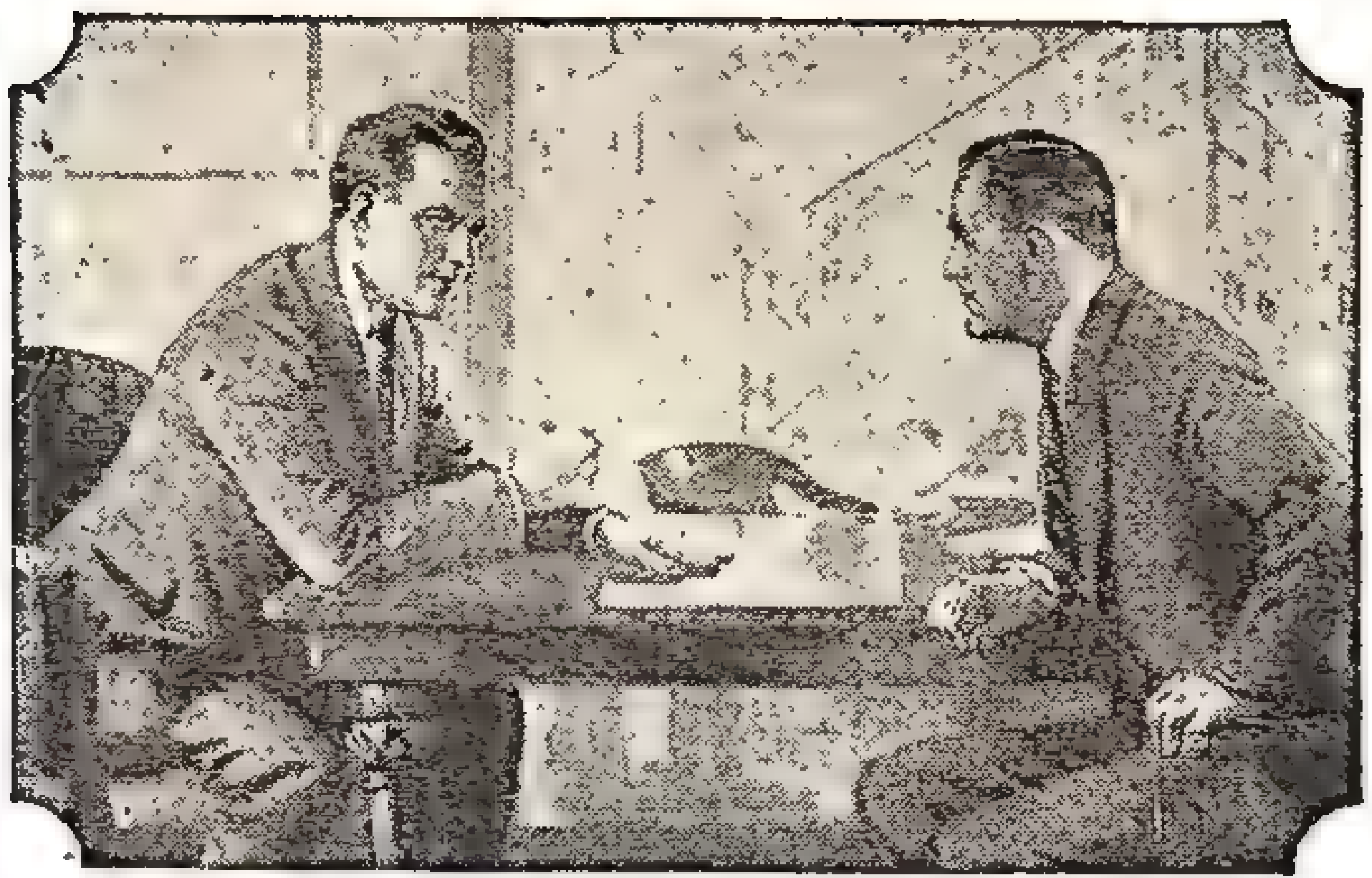
Cosmic rays constitute one of the most interesting problems of modern science. It will take many more years to study them and many more men will have to ascend into the stratosphere before we shall really know enough about them. Then we shall (perhaps) know where they come from and what they mean. They will (perhaps) tell us, or our children, a story of how matter is made or destroyed, high up in the cold vacancies of space, or in the blazing furnaces of the distant stars.

We cannot predict what marvels we shall know then—of course not! But one thing is certain: no knowledge comes without work; and work is good; and knowledge is good. When electricity was discovered, nobody knew what it might be good for. When helium was discovered, nobody thought it might be good for anything. Now it lifts our mighty dirigibles, and allows safe navigation of the air. History shows us that few things can be discovered which will not ultimately benefit mankind.

Wife to Pilot Balloon

Our projected ascension this summer will be my wife's first venture into the stratosphere. Why do I take my wife with me? Simply because I need a pilot to manage the balloon while I make my observations. What better pilot could a man find than his own wife?

What do we expect to see besides our cosmic ray observations? We shall see the deep blue sky of the stratosphere. With ten times less air above us, than at sea level, there will be ten times less diffused light about us, and instead of being light blue, the sky will be a deep purplish blue, almost black. If we can reach the stratosphere at night we shall see a magnificent spectacle. Having pierced the blurring veil of our atmosphere, we shall see the mighty pageant of the stars. The sight of the stars, alone, would be worth the whole trip, to my mind. It is hard to say what will be our greatest thrills on the projected flight; but I suppose the sight of millions of untwinkling stars in an absolutely black night-sky, will be the greatest of them all.



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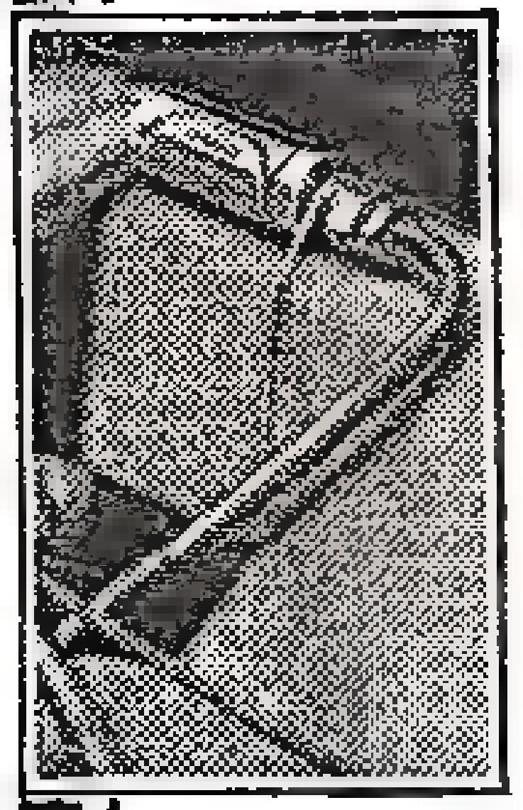

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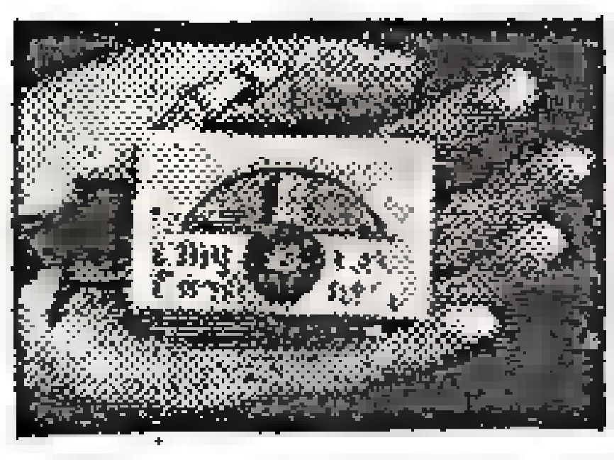

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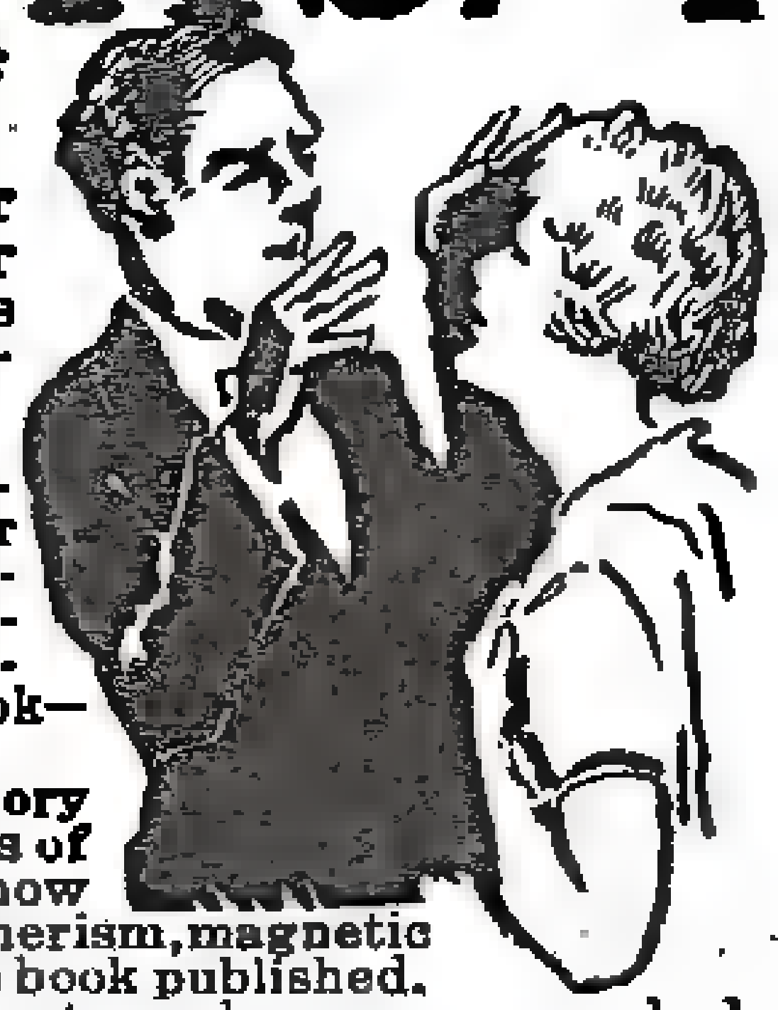

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Microscope Opens New World

(Continued from page 61)

croscopes for fingerprint investigations, bullet comparison microscopes to contrast scratches on projectiles, laboratory microscopes to detect blood crystals in suspicious stains, comparison microscopes to inspect forged documents, raised checks and tampered wills—these are but a handful of the ways in which the up-to-date sleuth harnesses the magic eye to track down malefactors.

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"Life in Ice" Prize Contest

(Continued from page 66)

above pictures were faked by special photographic processes? Give your reasons in 250 words or less, and be eligible for the other $25 in prizes, divided as above.

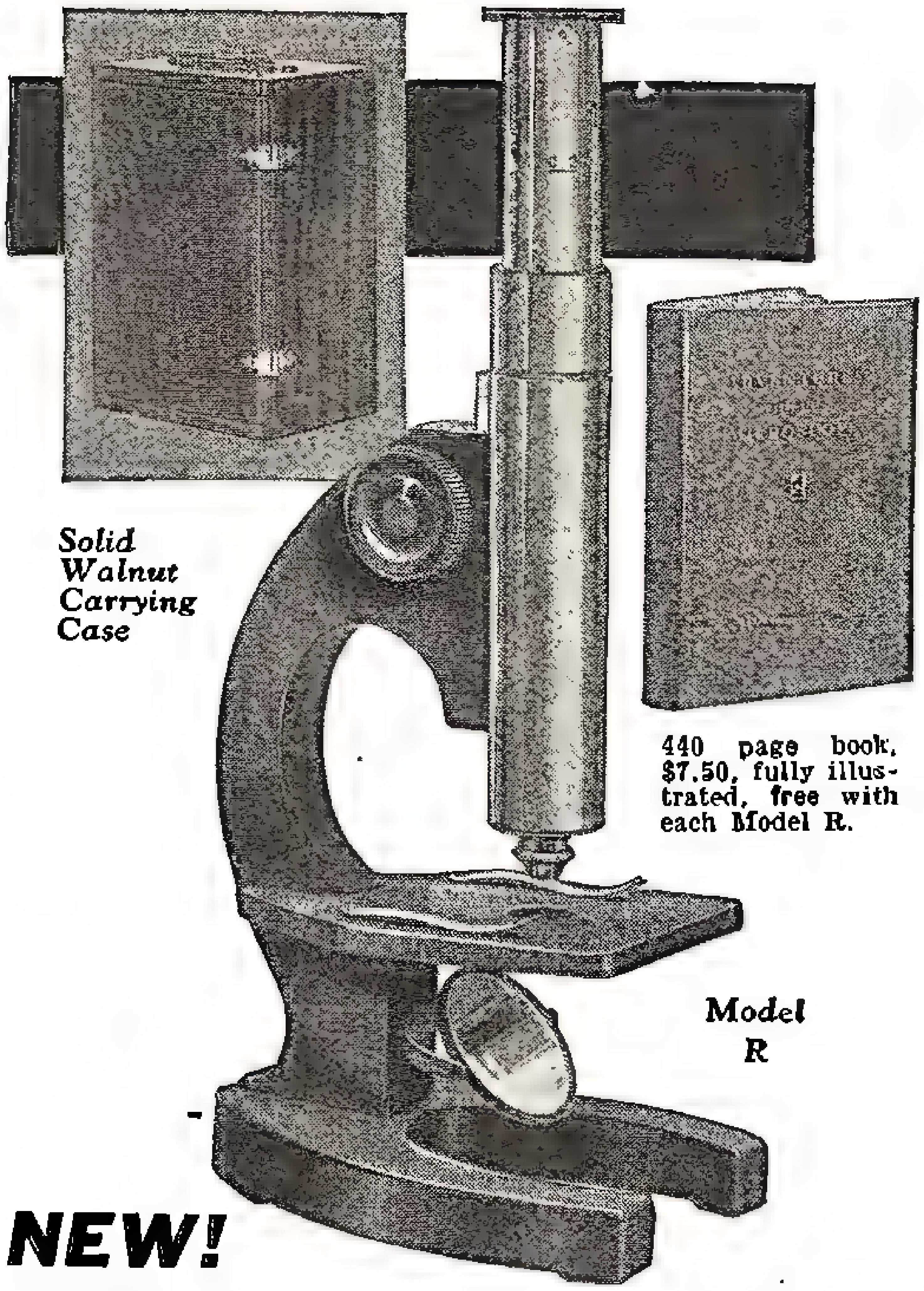
Judges will base their decisions on clearness of reasoning, originality of ideas, and neatness, rather than scientific accuracy.

Contestants must give age, occupation, and education, though this information will not be considered in awarding prizes.

Your entry should be postmarked before July 25, 1934. Decisions of judges will be final, and no entries returned. In case of ties, duplicate prizes will be awarded. Winning letters will appear in the October issue.

Employees of this magazine or their relatives are not eligible to compete. You don't have to buy a copy or be a subscriber to enter. Address M-M Contest Editor, 529 So. 7th St., Minneapolis, Minn.

Prize winners of the June contest are announced on page 142.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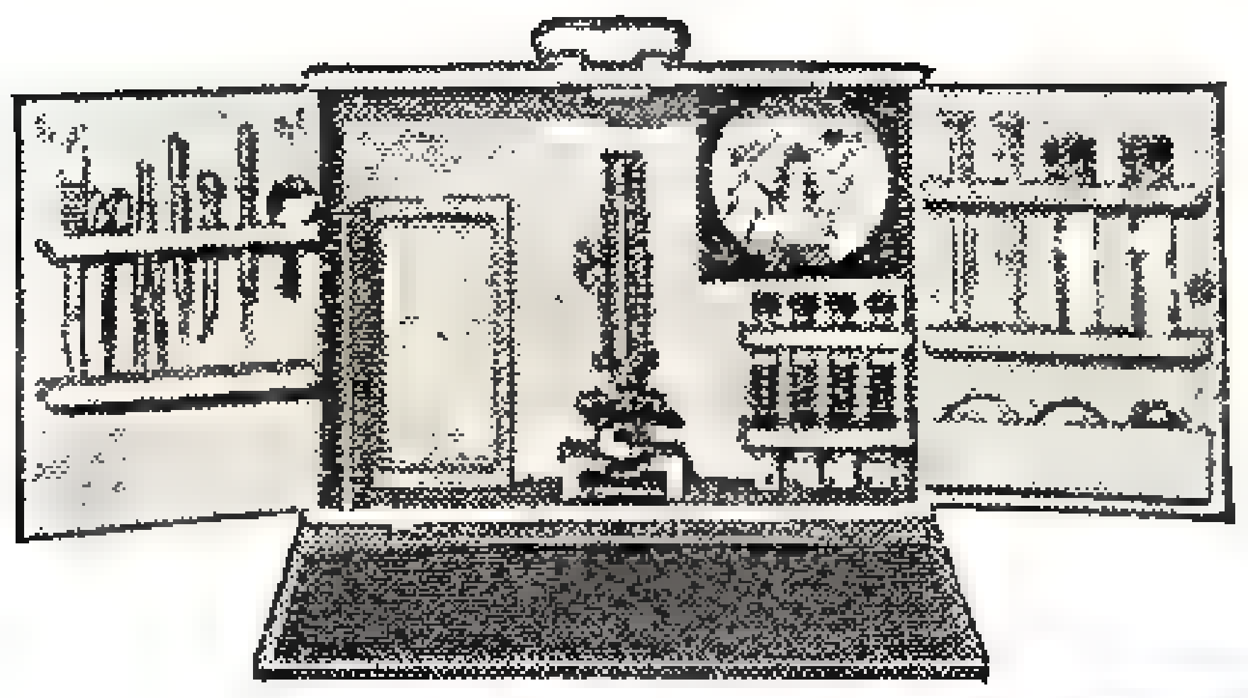

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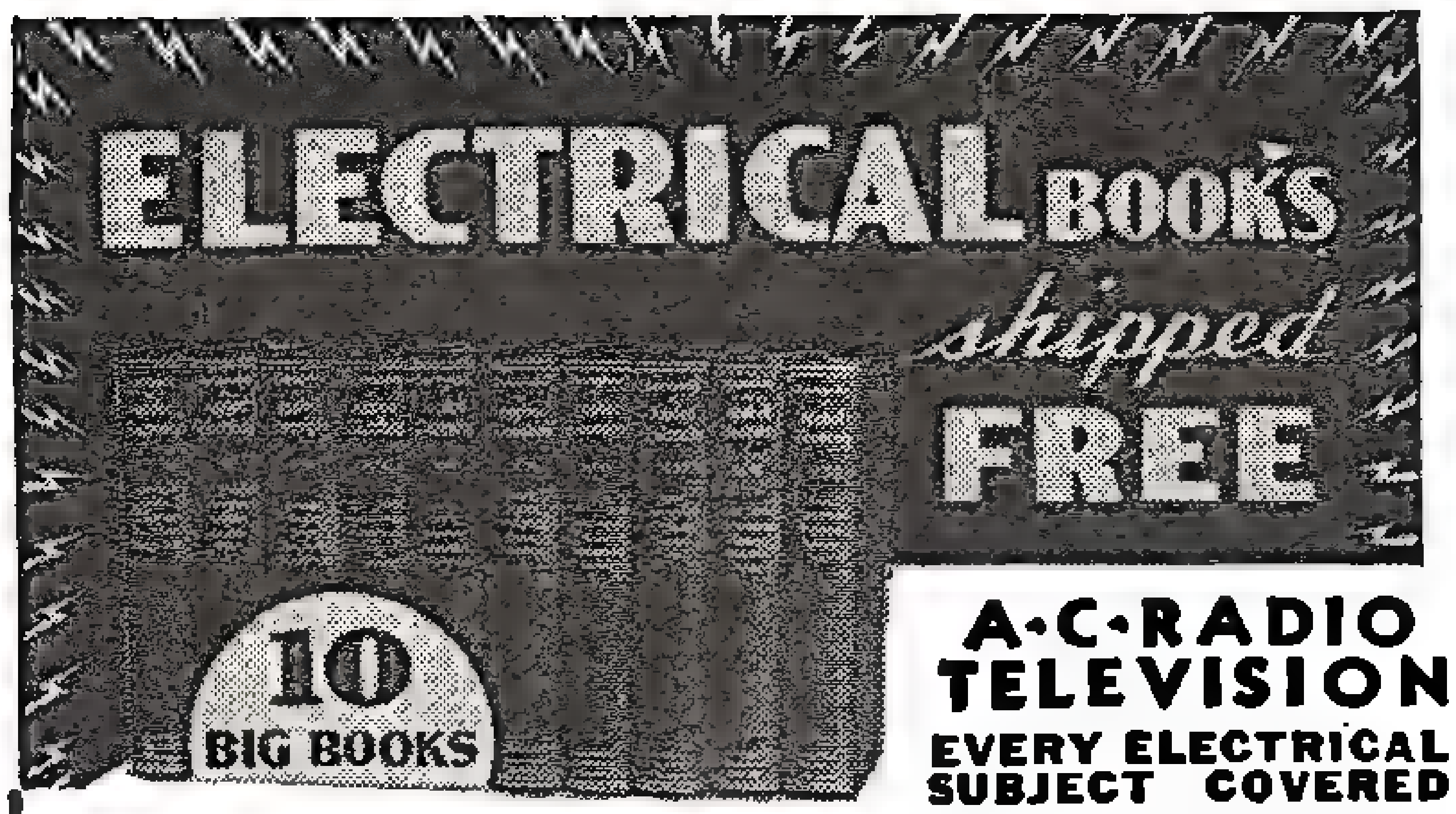

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Radio Hunters to Seek Pirate Gold

(Continued from page 54)

metals is determined, samples are obtained by an ordinary mineral drill. Digging operations follow if the sample is promising.

Skeptics profess to believe that the treasure of Cocos Island is non-existent, pointing to the failures of innumerable gold-seekers as proof of their contention. There is a reason for these failures. Cocos Island is a green, treacherous land, hostile to invaders. Its precipitous cliffs are almost hidden under masses of tangled foliage. The inland shrubbery is so thick that even the wild pigs find parts of the island impassable. The terrain is rugged, strewn with boulders and pockmarked with pits and treacherous gullies. There is scarcely a level spot on the island—only in two or three places is it possible to pitch a tent.

Story of the Cocos Treasure

But the treasure is there and its story is one of the most remarkable sagas of buried gold in the history of the world. Legend has it that the Incas started the treasure ball rolling by sailing to Cocos Island 400 years ago, laden with gold and precious ornaments to escape the cruelties of the Spanish conquerors. This account, of course, lacks authenticity; but later records prove that the Cocos treasure is not a myth.

The real story of Cocos Island begins some 250 years ago, in the days of Captain Edward Davis, as swashbuckling a pirate as ever sailed the Spanish Main. Following a series of successful forays in the Caribbean, Davis and his men swept around the Horn and up the west coast of South America, looking for fresh plunder. Spanish ships and garrisons fell before his ruthless onslaughts, each yielding up a store of gold and silver.

With the hold of his vessel filled with Spanish treasure, Davis sailed north to Cocos Island. Here he beached his ship, scraped the barnacles from her bottom and buried his booty. Putting to sea again he resumed his raids and as his treasure grew, he returned again and again to Cocos. On one of these trips alone, a chronicler of the times reports that Captain Davis buried "Three hundred thousand pounds' weight in silver dollars, seven hundred and thirty-three bars of gold; also seven kegs of gold coins."

Stronghold of the Buccaneers

But Captain Davis was not the only one to seek sanctuary for his plunder on Cocos Island. The rocky stronghold was a favorite resort for innumerable buccaneers who could not return to civilization with their bloody gold while the hands of the outraged nations were lifted against them. In consequence, they buried their loot on Cocos, hoping to return at some later date and retrieve it. But their high hopes were doomed. Many of them lived only to swing from a yardarm or a hangman's gibbet and their treasure still lies on Cocos, buried perhaps forever.

The records of these swashbuckling days are necessarily hazy but definite proof of the existence on Cocos of still other pirate gold

Radio Hunters to Seek Pirate Gold

is found in the history of the notorious freebooter known as Bonito of the Bloody Sword. History had moved on a hundred years since the days of Captain Davis when Bonito hoisted the Jolly Roger to his main truck and began to carve out a sinister career for himself with his thirsty sword. Utterly ruthless, Bonito was the scourge of the Pacific. He swept the coast like a plague, leaving a trail of sunken galleons and burning towns in his wake. And with the taking of each new prize, he sailed for Cocos to secrete his booty.

The Golden Treasure of Lima

About the same time that Bonito was depositing his plunder in the Cocos safety vaults, thrilling events were transpiring on the mainland. Bolivar the Liberator, a soldier-statesman who was to free what is now Venezuela, Colombia, Ecuador, Panama, Bolivia and Peru from Spanish rule, was sweeping down on Lima, capital of Peru, Spain's treasure stronghold in the New World. Terrified, the Spanish aristocrats prepared to flee. Loading a twelve million dollar cargo aboard the *Mary Dear*, an English brig commanded by a Captain Thompson, they sailed from Callao, Lima's seaport, bound, as they thought, for Cape Horn and the ultimate safety of Spanish waters. But Thompson was not proof against the lure of his golden cargo. Once clear of Callao, he slew the Spanish refugees and set a course for Cocos Island where he buried his plunder.

Cocos Island itself is the chief goal of the modern gold seekers; but the pirate territory surrounding it is virtually teeming with treasure trove. No one knows what vast amounts of gold and silver lie buried, fathoms deep, in the hulks of sunken galleons driven on the jagged reefs by coastal hurricanes or blasted into the deeps by the fire of pirate guns.

Where Pirate Gold Still Lies

Panama City, for example, still holds the secret of a vast store of plate, jewels and bullion buried when Sir Henry Morgan raided the town in 1671. The tiny island of Trinidad, in the South Atlantic, off Brazil, still guards a secret pirate hoard. The islands of the old Spanish Main (now the West Indies) are fertile hunting grounds for modern treasure seekers. Haiti, Tortuga, Cuba, Jamaica and St. Kitts—each has its stories of pirate gold, guarded by the ghosts of ancient buccaneers.

Stevenson's dream of "Treasure Island" is coming true. Recently a find of $45,000,000 in Peruvian gold ingots was reported in the Tuamotu archipelago, east of Tahiti. Modern machinery and scientific apparatus is being rushed to the spot. A coffer dam is to be constructed to recover the gold which lies in eighteen feet of water. All over the world men are arming themselves with twentieth century weapons to answer the call of treasure trove. Science has taken up the ancient pirate challenge. Treasure hunting is big business now.

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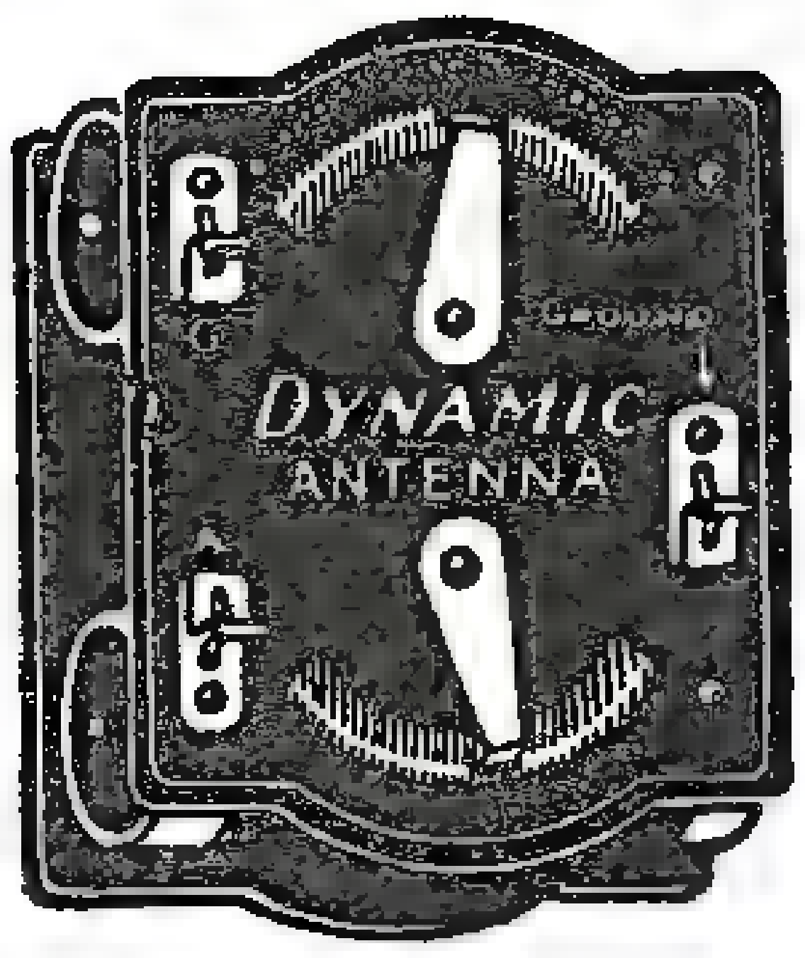

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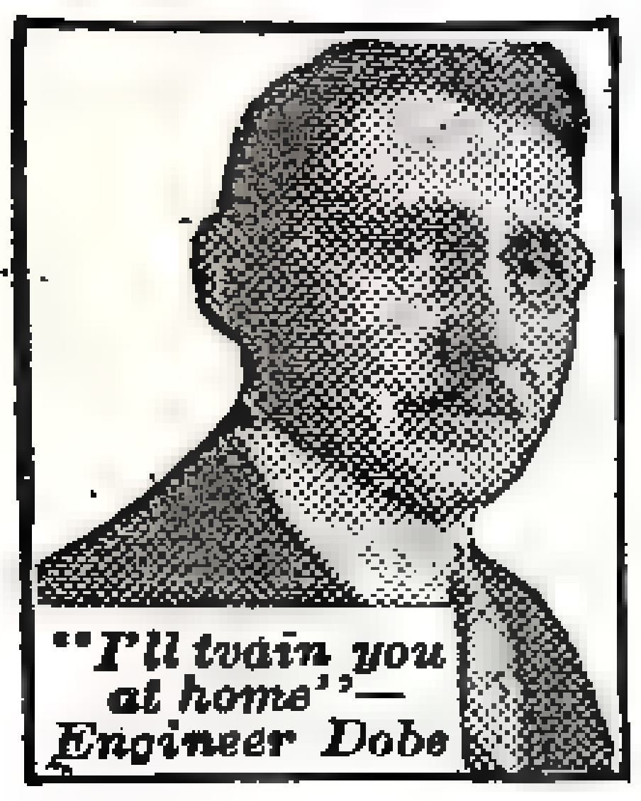

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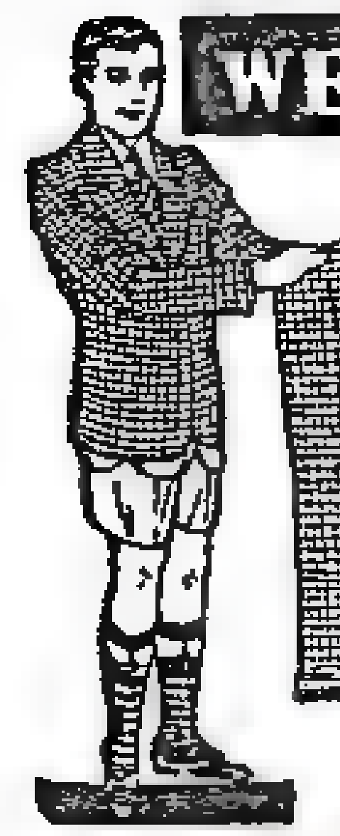

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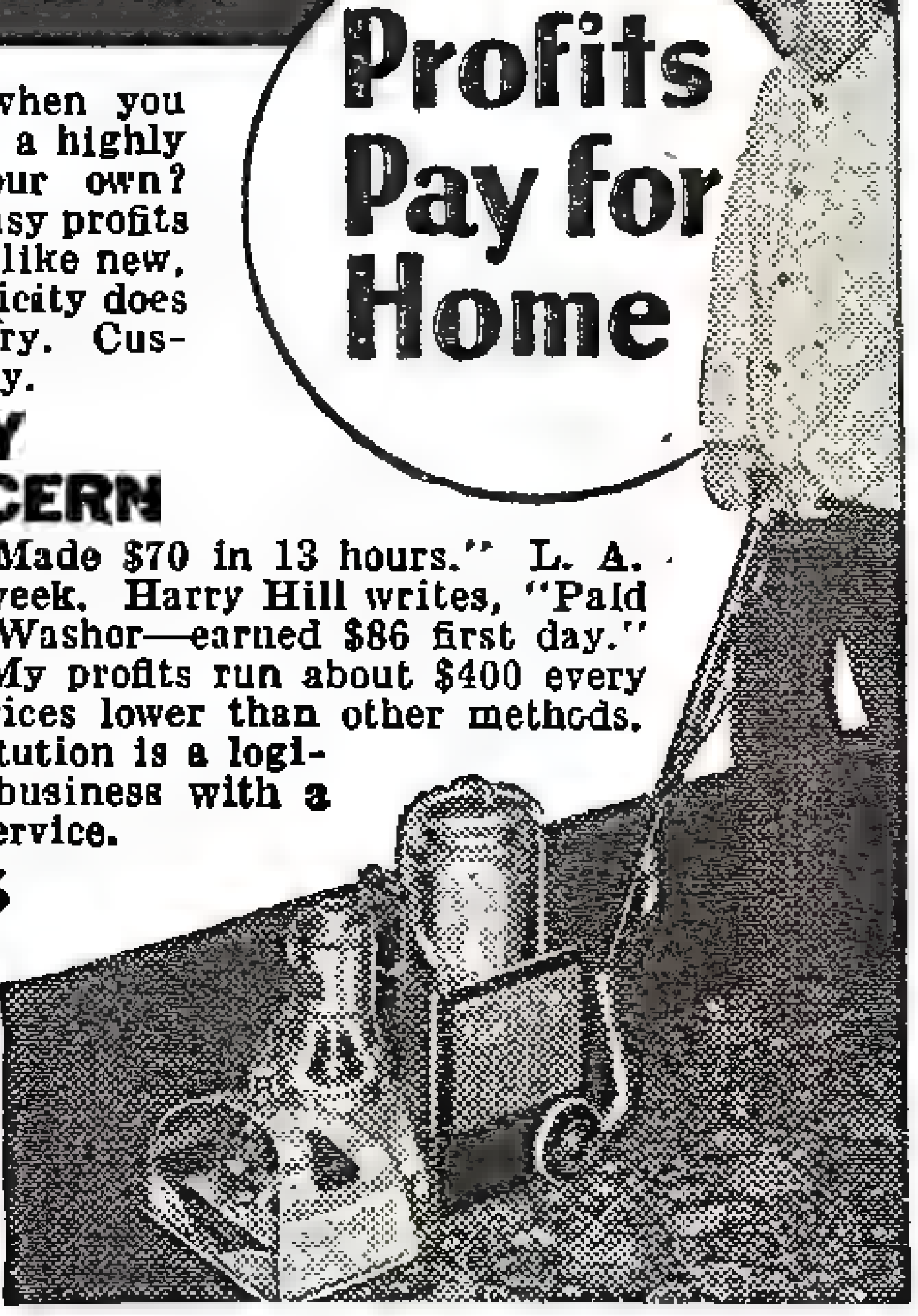

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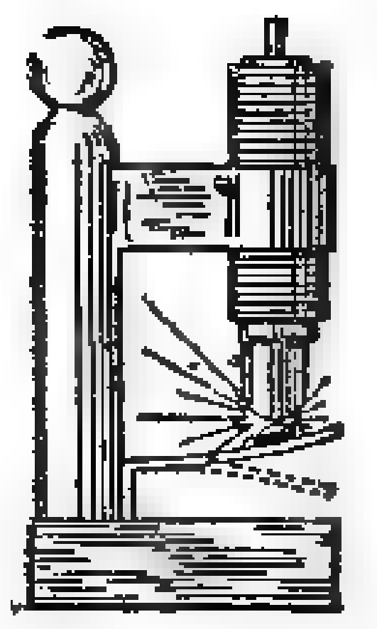

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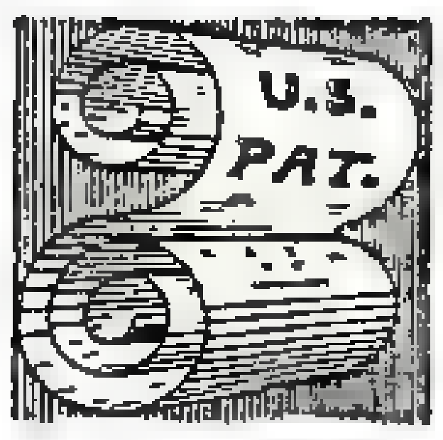

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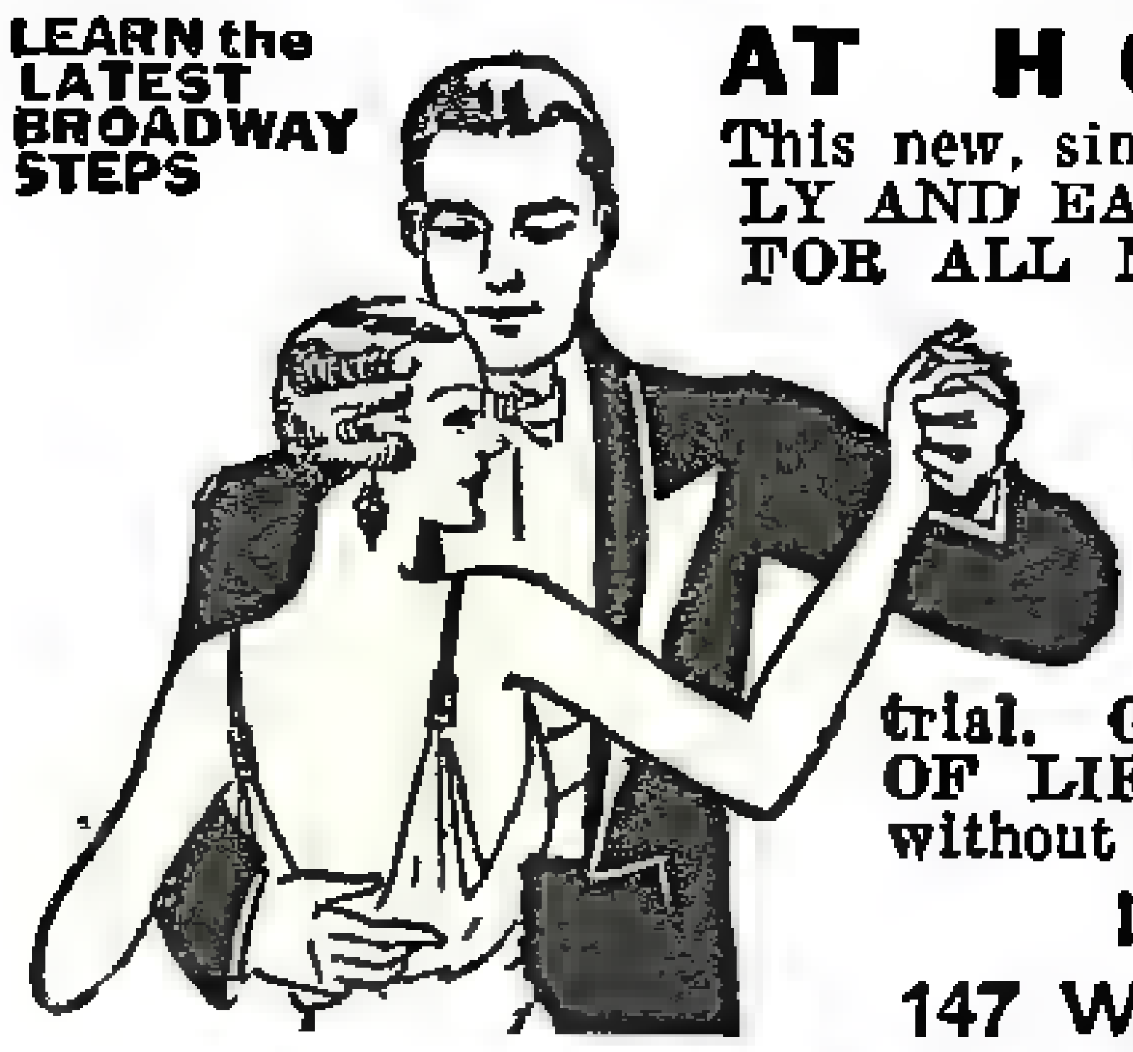
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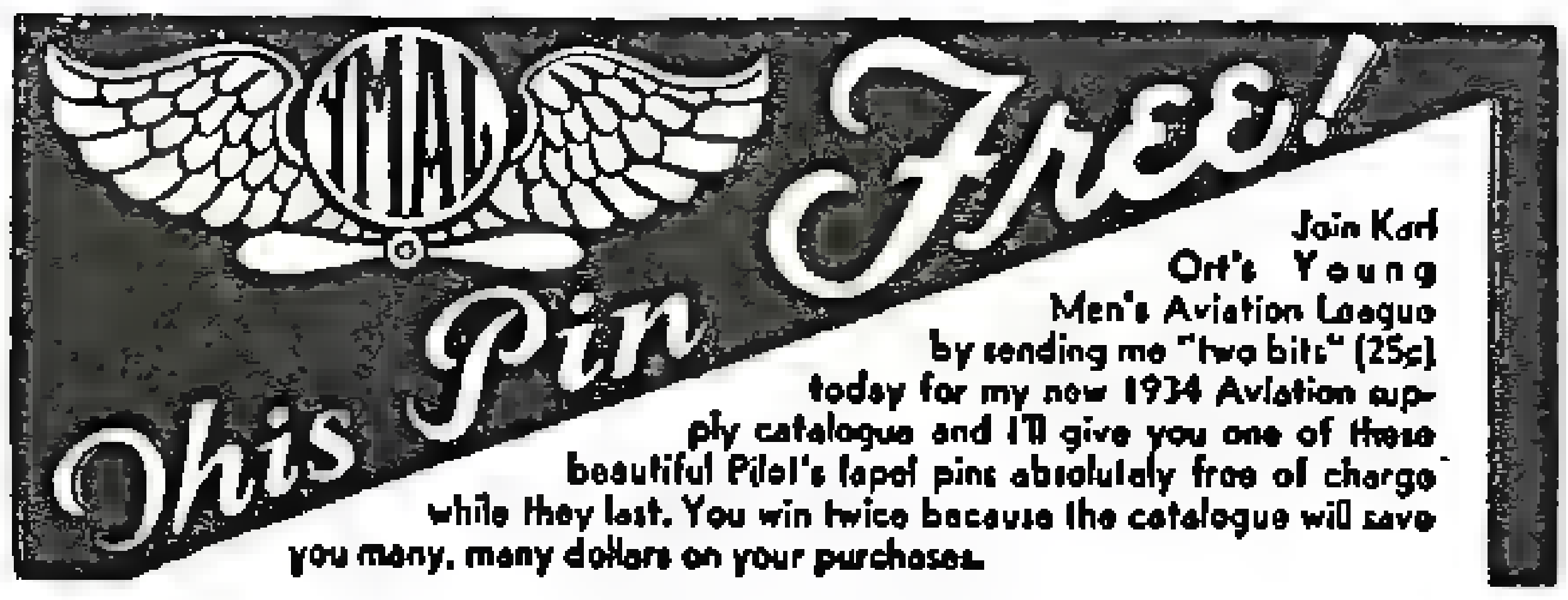

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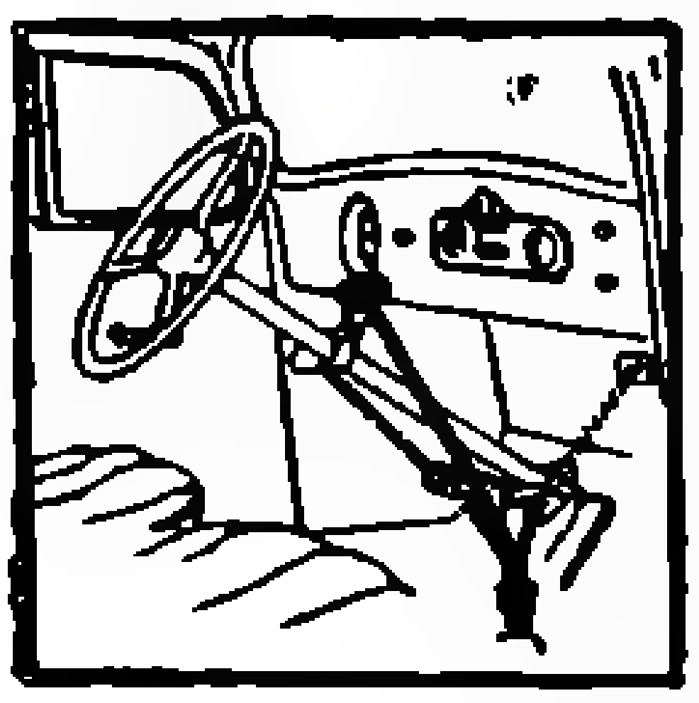

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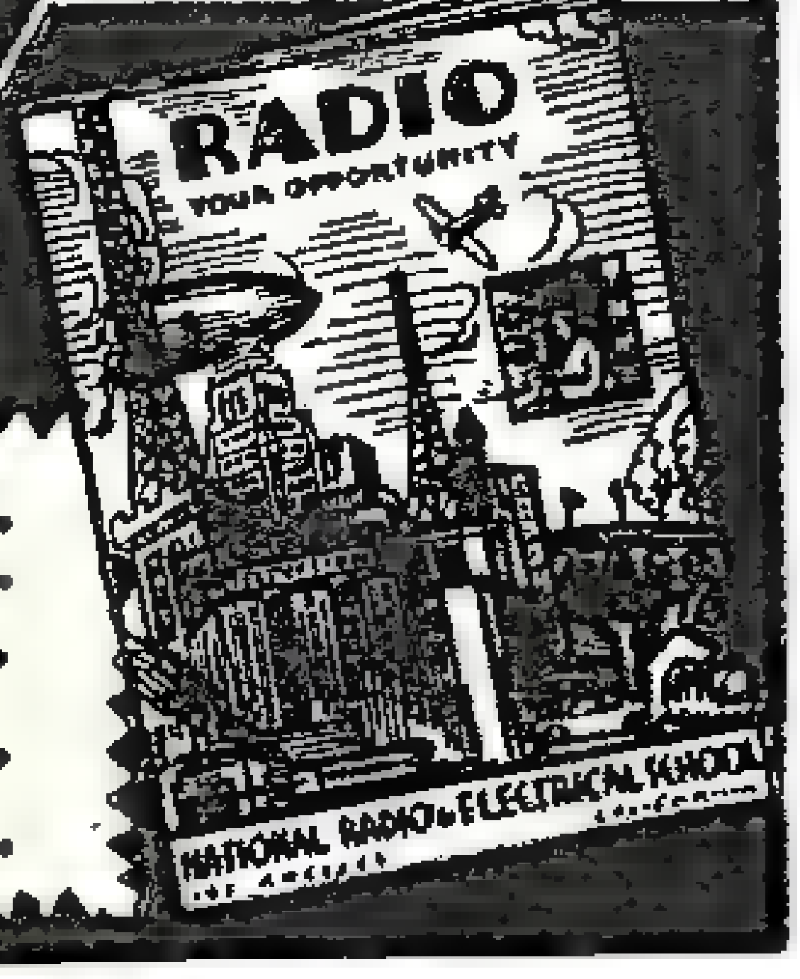

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FOR INVENTORS And Mechanical Minded Men *How* TO OBTAIN A

Answers to Questions on Page 33

1. By patenting the invention.
2. Send sketch or model and description with search fee to a registered patent attorney.
3. 1101 U. S.—1279 Foreign.
4. Abraham Lincoln.
5. 17 years.
6. It confers on patentee the exclusive right to make, sell and use the invention covered by the patent.
7. No. Pencil sketch and description will usually suffice.
8. A form on which an inventor may execute his sketch and description. When properly filled out it is documentary evidence of your conception of the invention.
9. Because a layman or a lawyer in general practice is not learned in patent office practice.
10. As soon as patent application covering the invention is filed in United States Patent Office and official receipt received.

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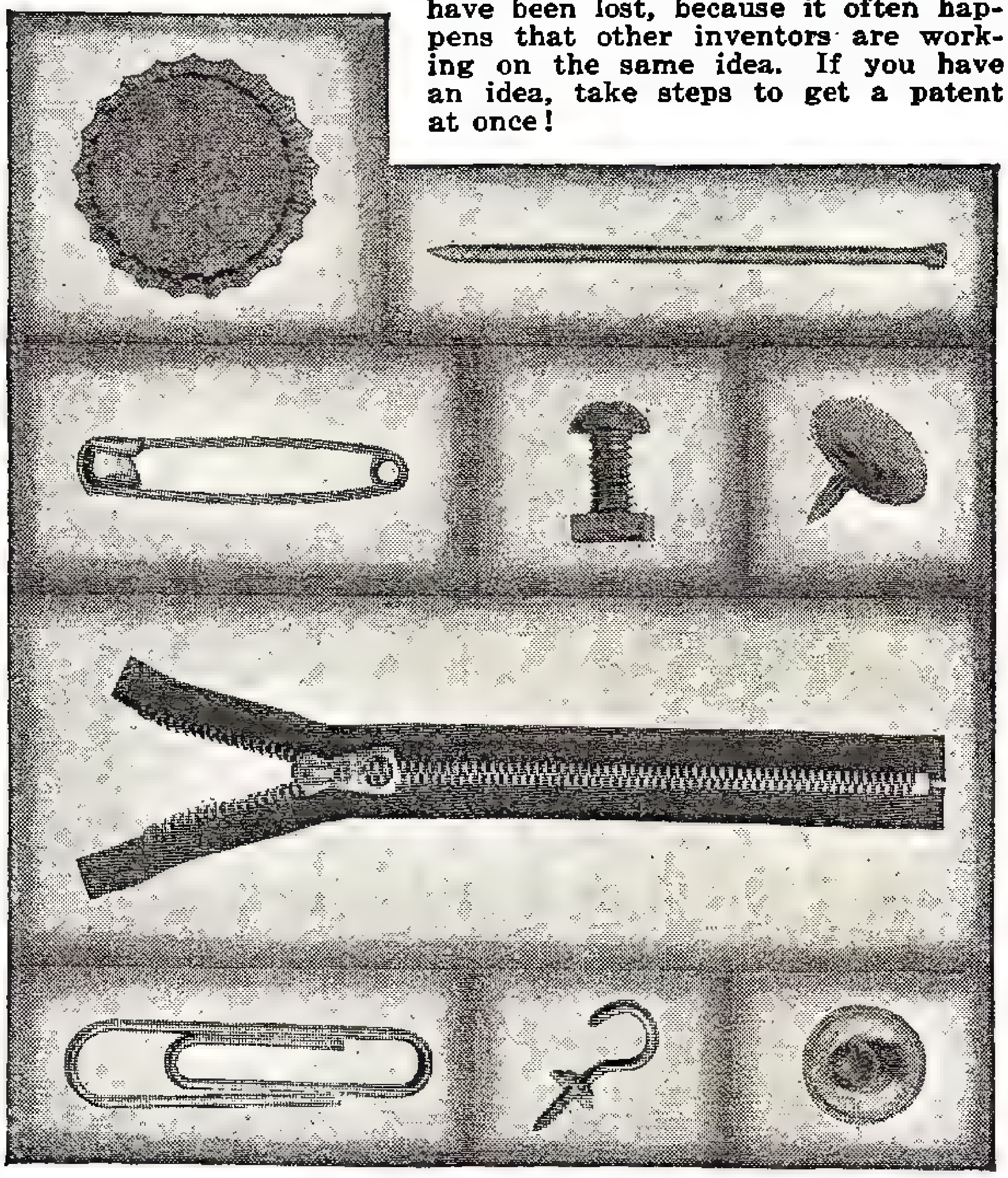

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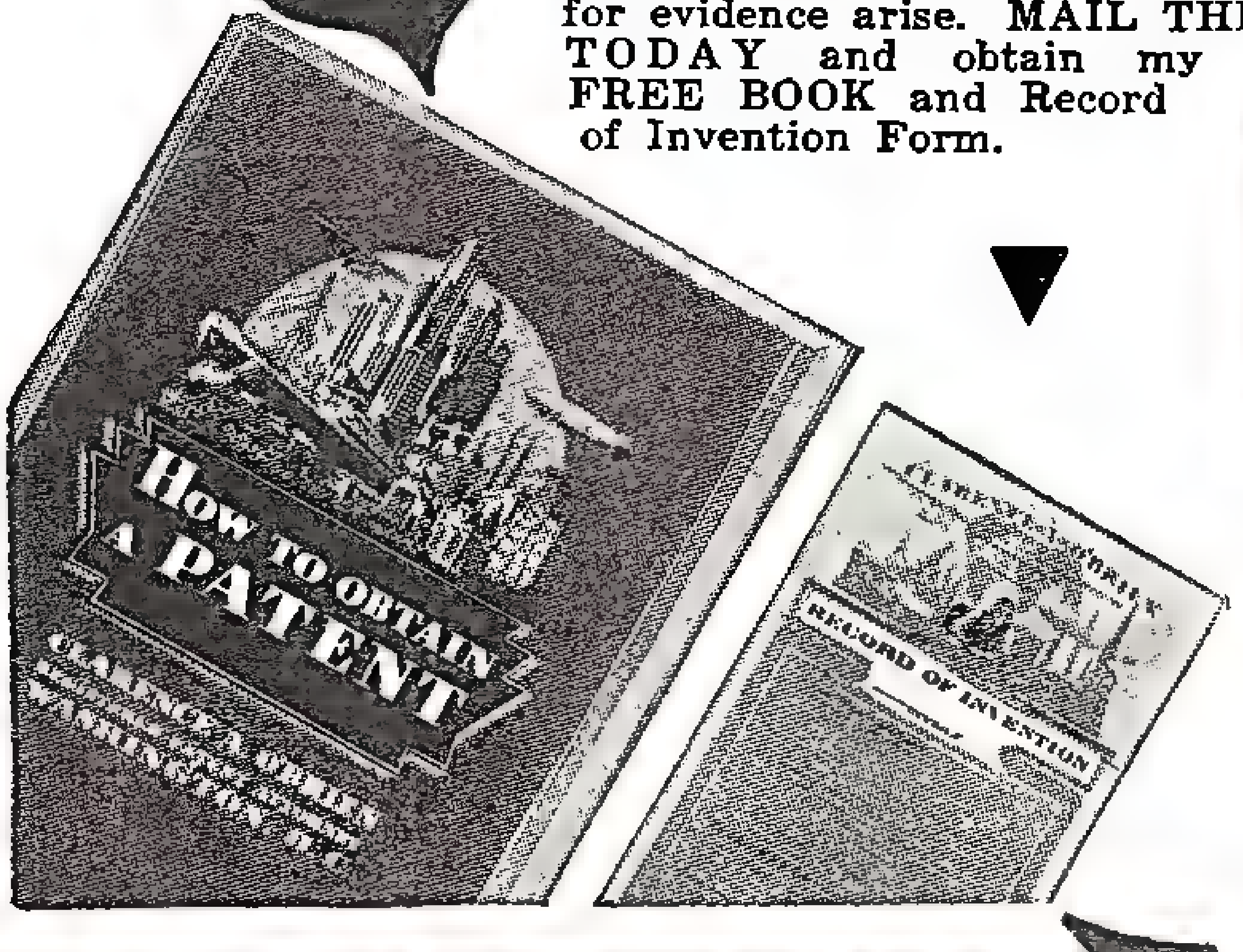

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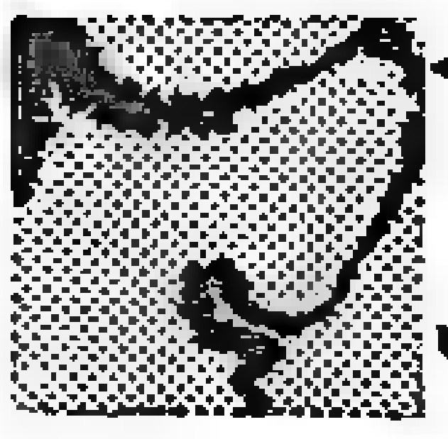
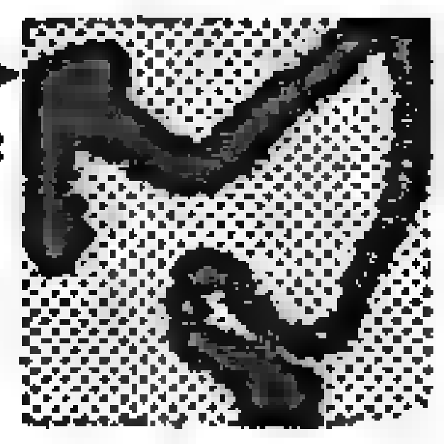


Note stringy, knotty unhealthy colon.



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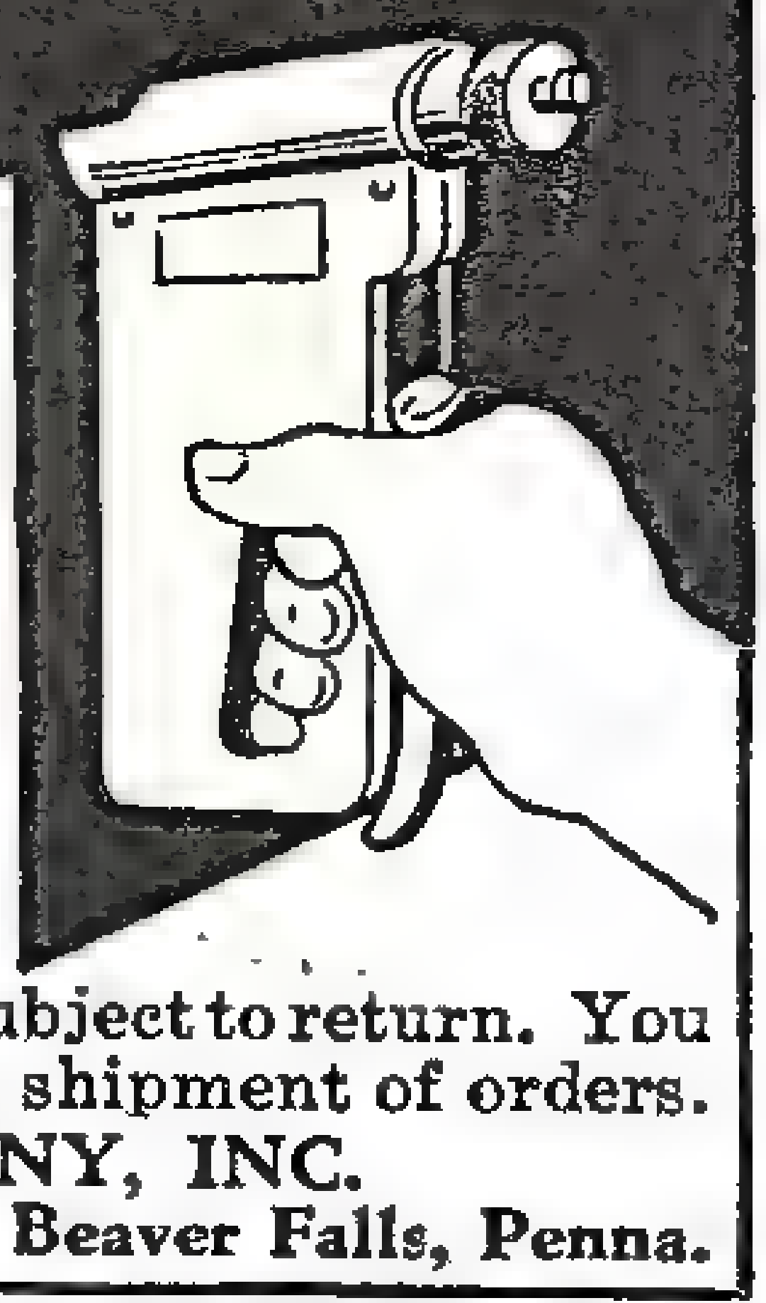

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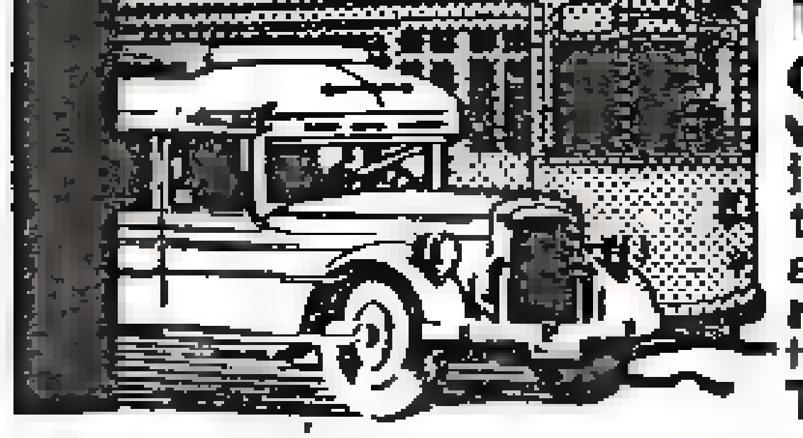

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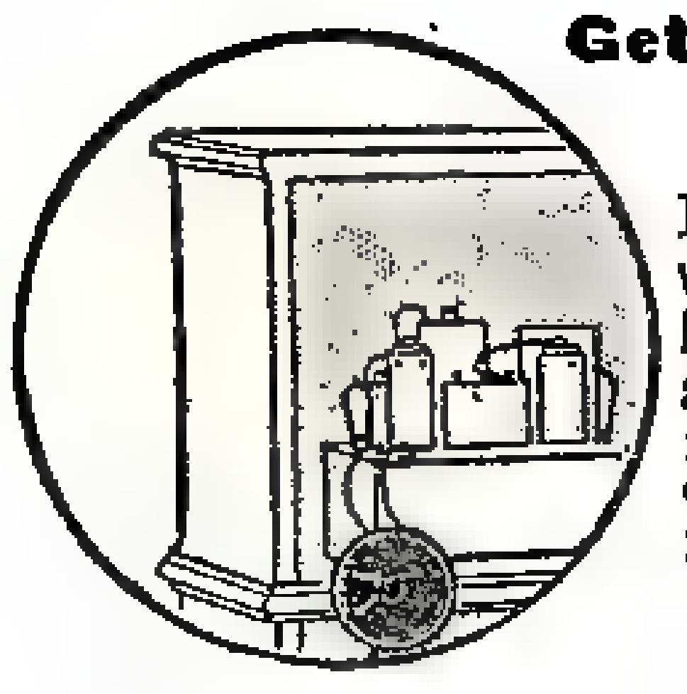

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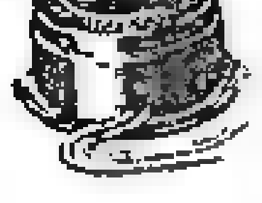

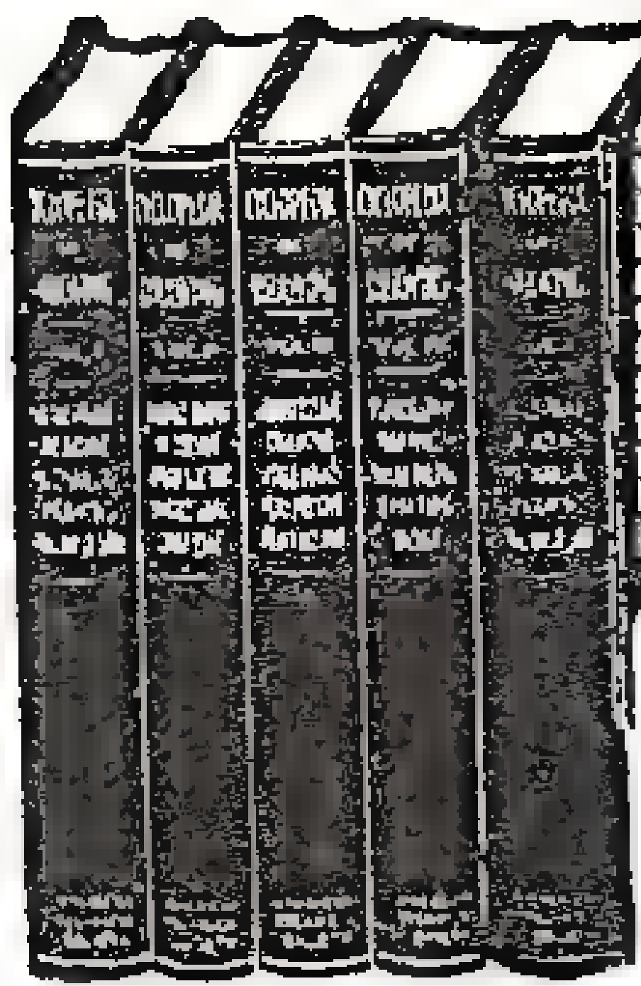

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Fortunes in Needed Inventions

(Continued from page 75)

This knife not only permits the operator to cut through many thicknesses but at the same time allows him to follow the outline of the pattern more closely. While a housewife who sews only occasionally could not be expected to buy such an expensive machine, there is no reason why she would not buy a mechanical knife of the rotary kind that would sell for one dollar. The knife could be operated with the sewing machine pedal or motor.

A low-priced clothes line reel that will automatically wipe the line off when it is taken out and replaced on the reel would be bought by several million housewives.

The man who is able to invent some sort of a blotting device that can be carried in the cap or on the end of a fountain pen will make himself a tremendous fortune. Who has not seen the owner of a fountain pen waving a freshly written check through the air to speed the drying of the ink?

Millions of people would use a special cork for the ordinary ink bottle. The stopper should open easily when the pen is dipped in, but close automatically afterward. This would prevent accidents through spilling and eliminate any need for the original cork.

A toothpick dispenser for restaurants that will give out only one article at a time is badly needed. Remaining picks should be in a dust-tight container where they cannot be touched by hands of other people.

One of the most valuable instruments on the panel of an automobile would be an oil viscosity meter to tell the motorist when to change his oil.

There is also needed a closing device for auto gas tanks to replace the cap. Caps are easily lost, and are often put on too tightly. What is needed is a closing method that will easily open at all times, and at the same time provide a perfect seal for the tank.

A cheap little nickel or ten cent gadget that will really stop the rattle of car windows will also find a big market among owners of old automobiles.

June 3 Teaser Contest Winners

THE three teasers in the June M-M contest indeed proved to be tricky. Most entrants obtained the correct answer of 571 lbs. for No. 1, those who tried rolling two coins around agreed that 2 times was correct for No. 3, but answers to the clock problem varied over a period of centuries. March 21, 1900 is the day when all three clocks will first be correct at noon.

The simply stated but absolutely correct solutions of Jack Wasserman, 16-year-old high school student of Bronx, New York City, bring to him first prize of $10.

Thomas Gaffney, Jr., sophomore at the University of California, receives 2nd prize of $5. Prizes of $2.50 each go to Henry Lacrampe, Oakland, Cal., Charles Smith, Wilkinsburg, Pa., Emile Kamps, Montreal, Canada, and Theodore Hetze, Eau Claire, Wis.

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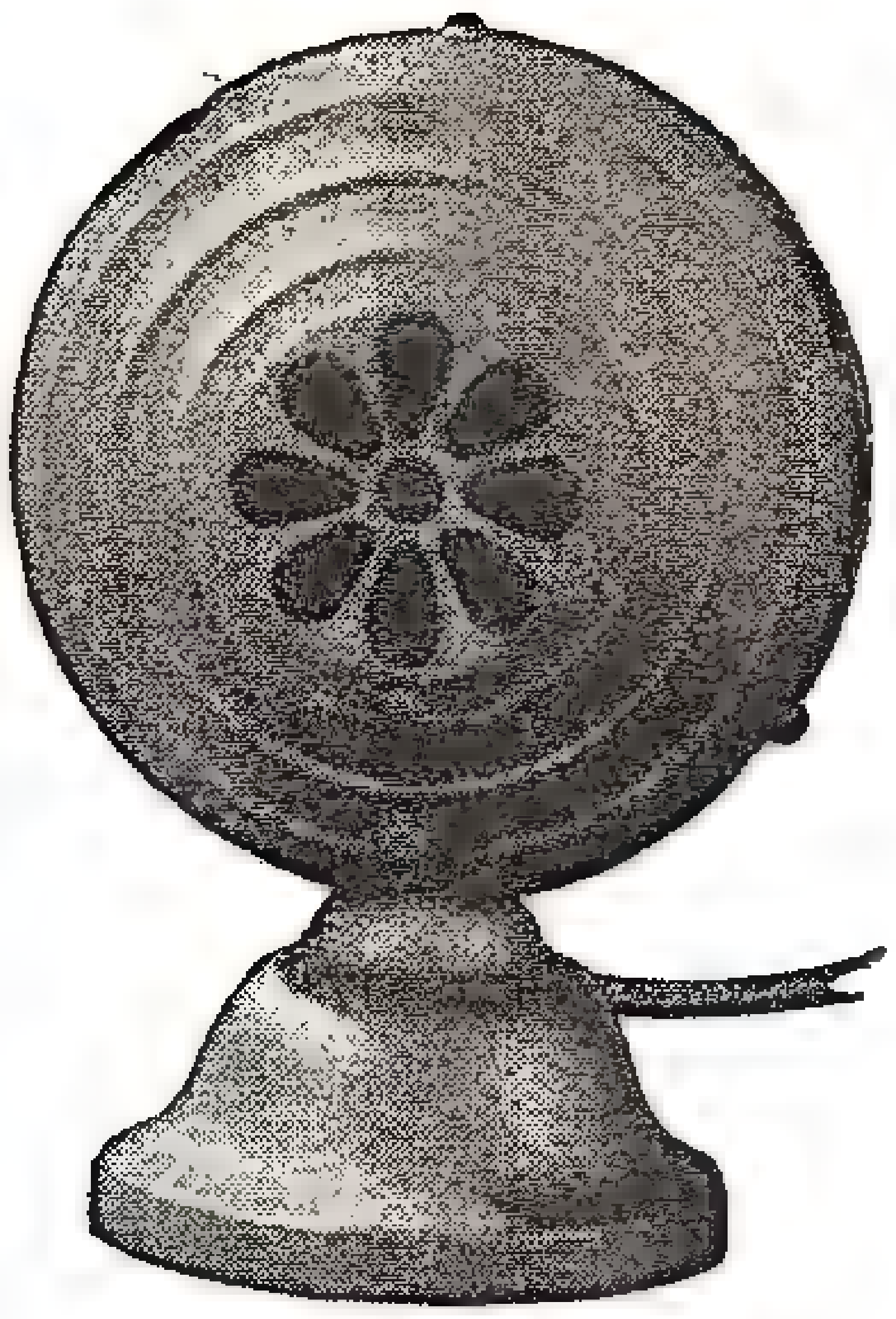

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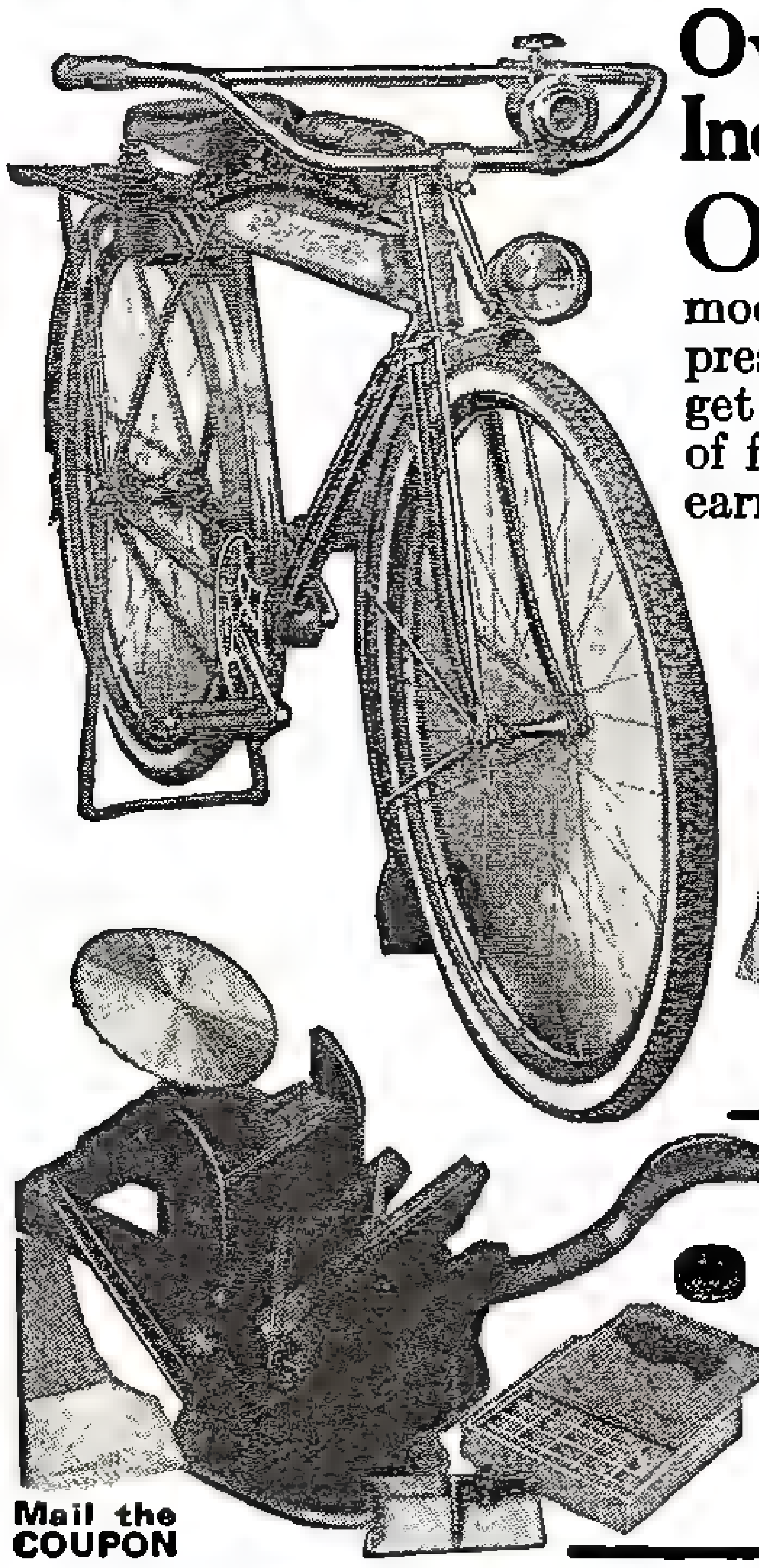

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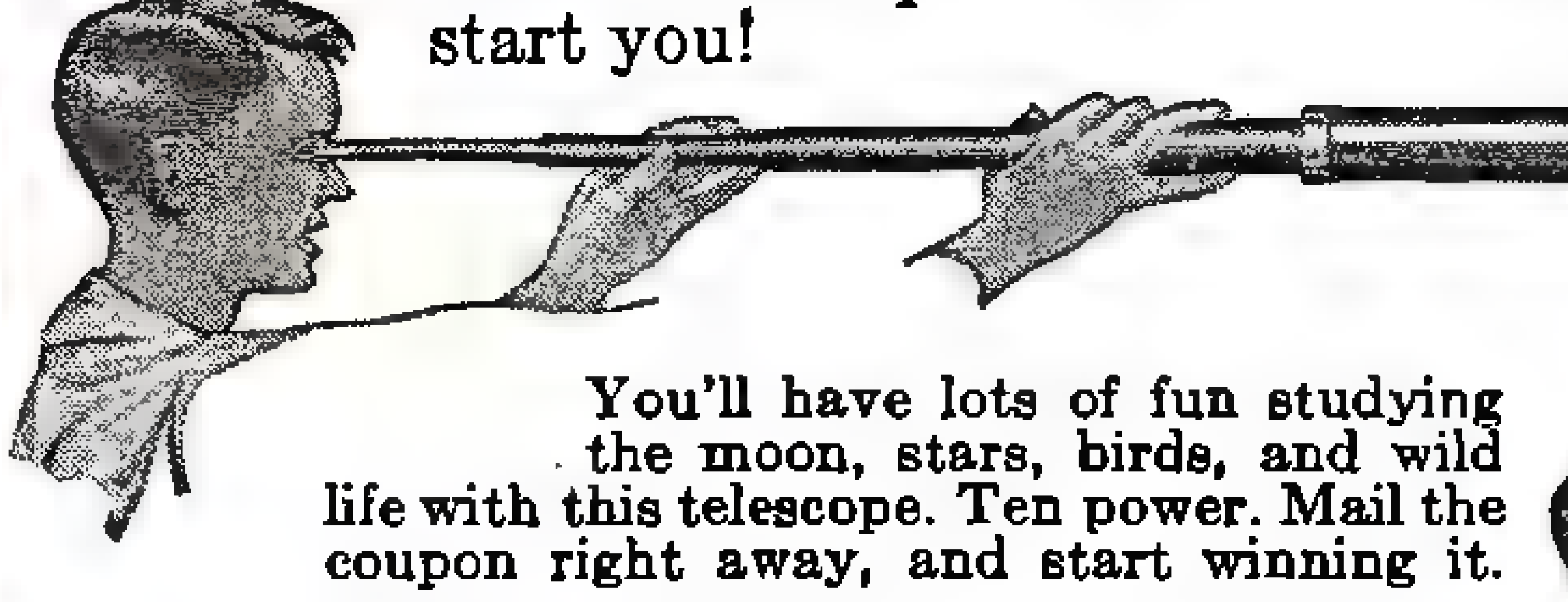

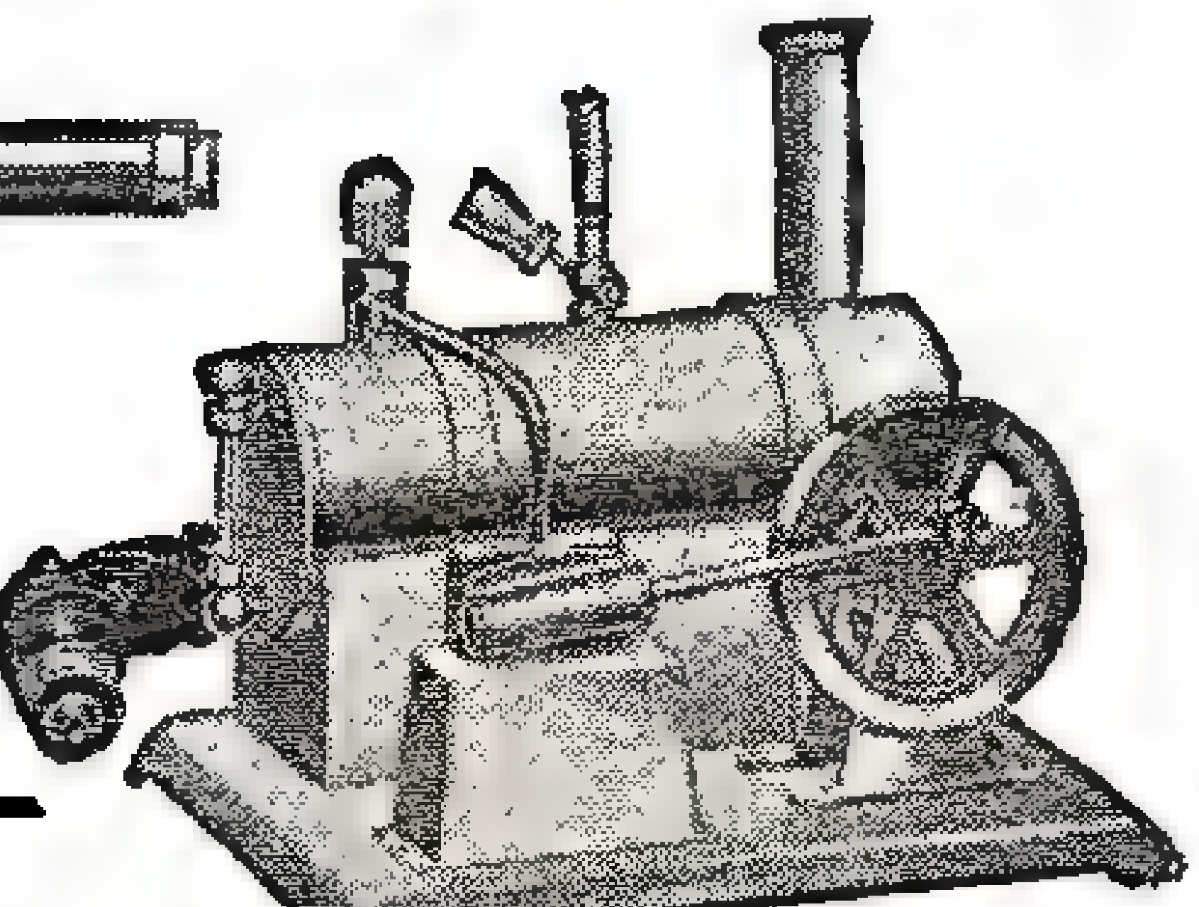

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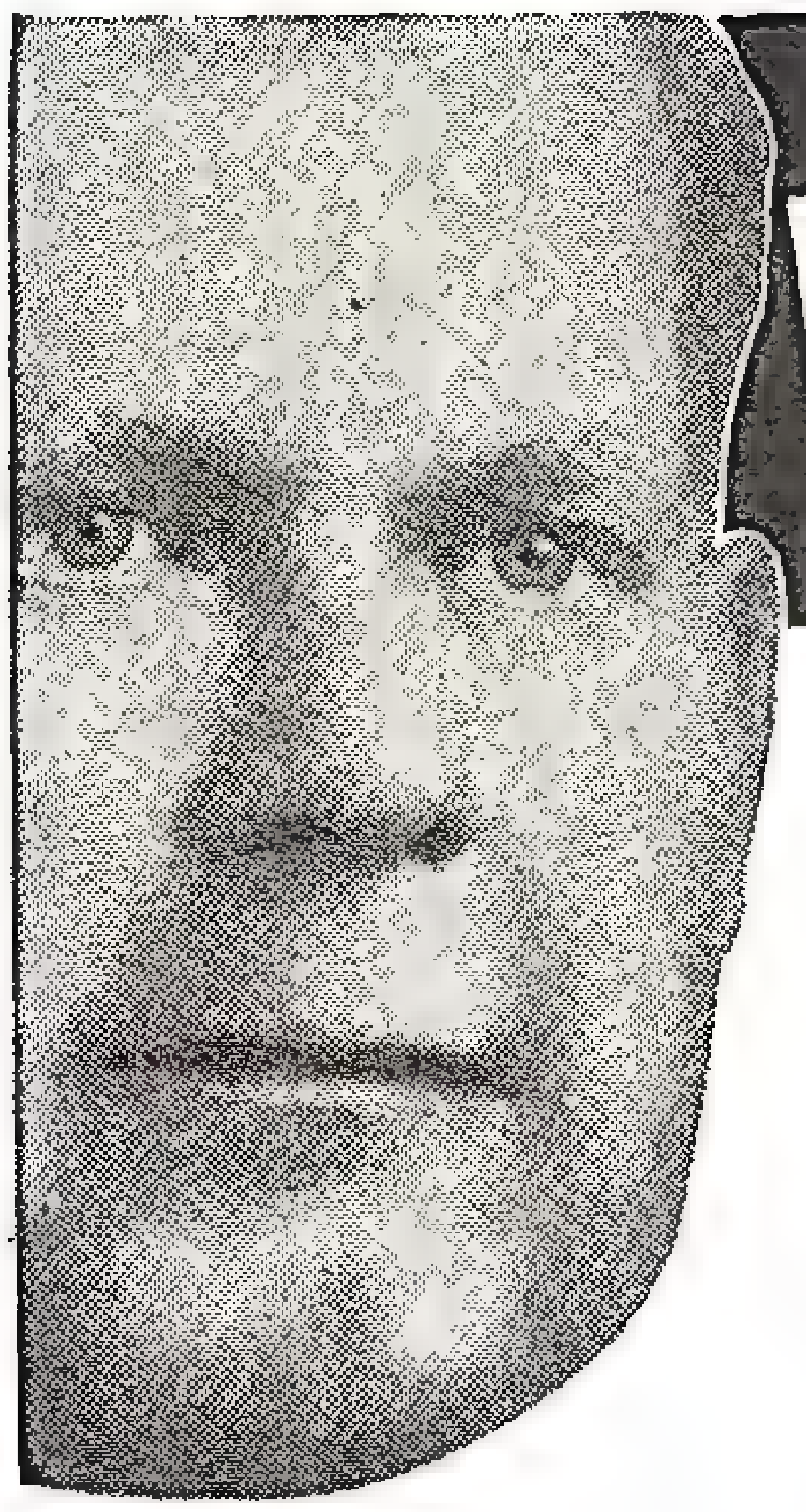

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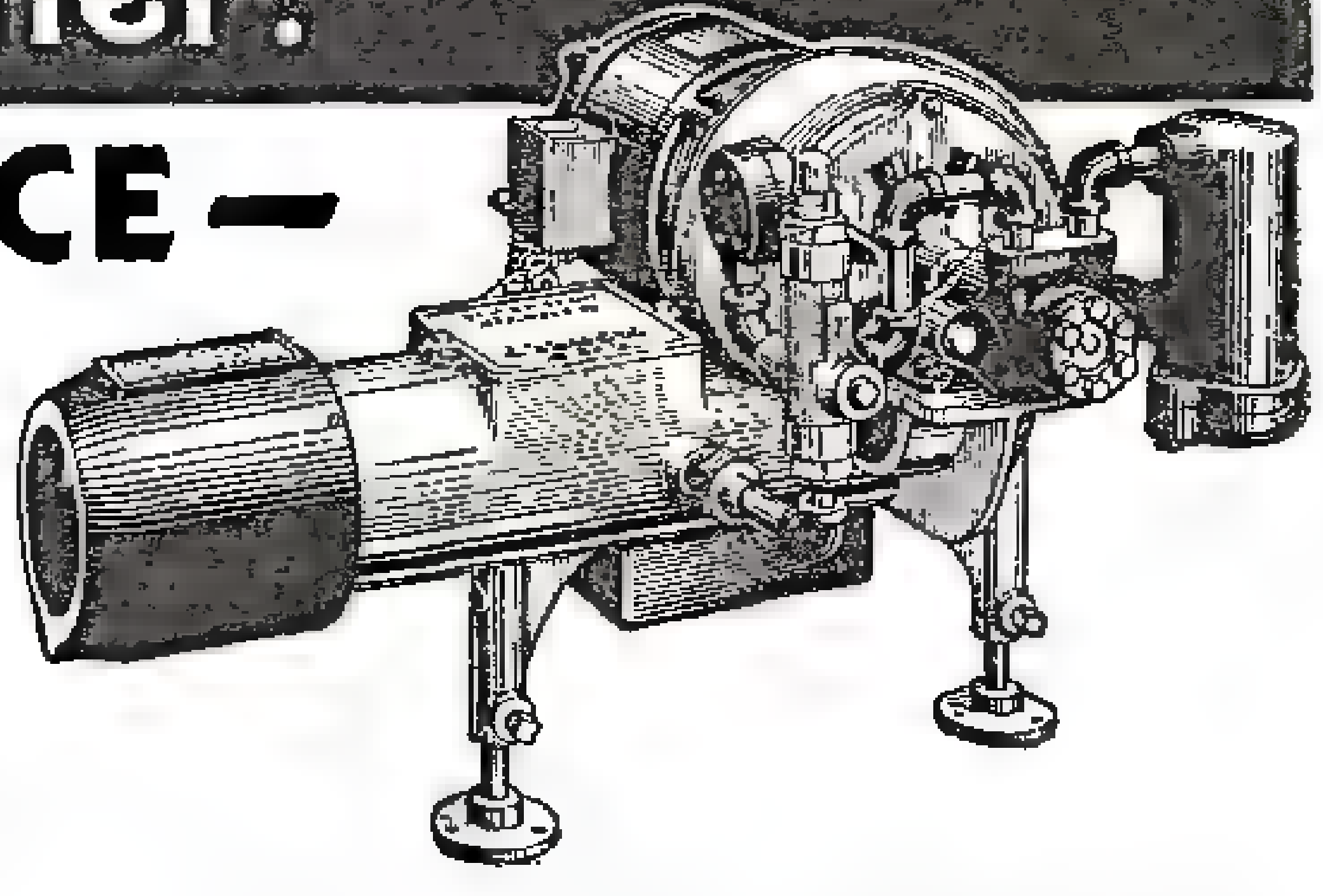

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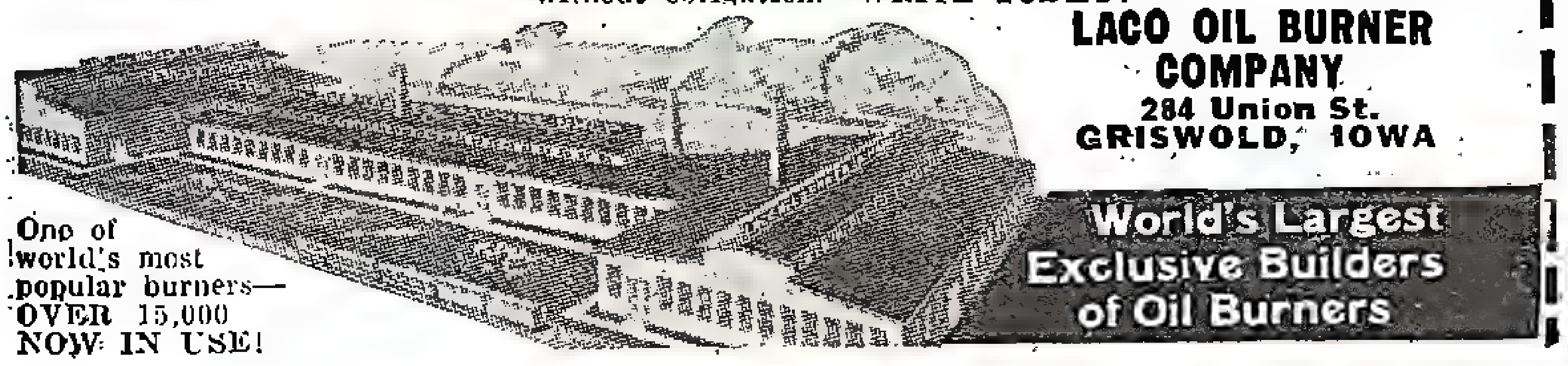

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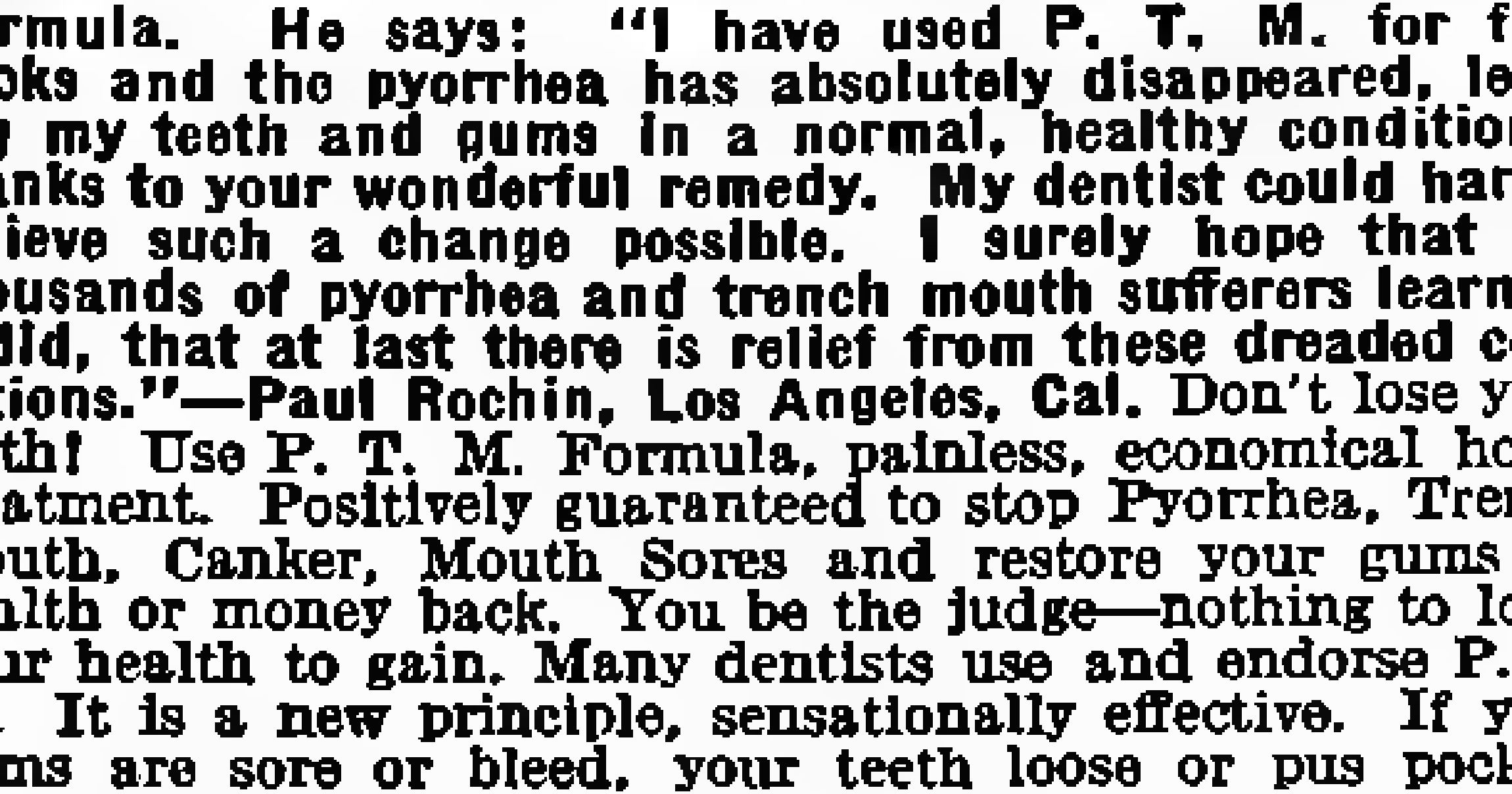

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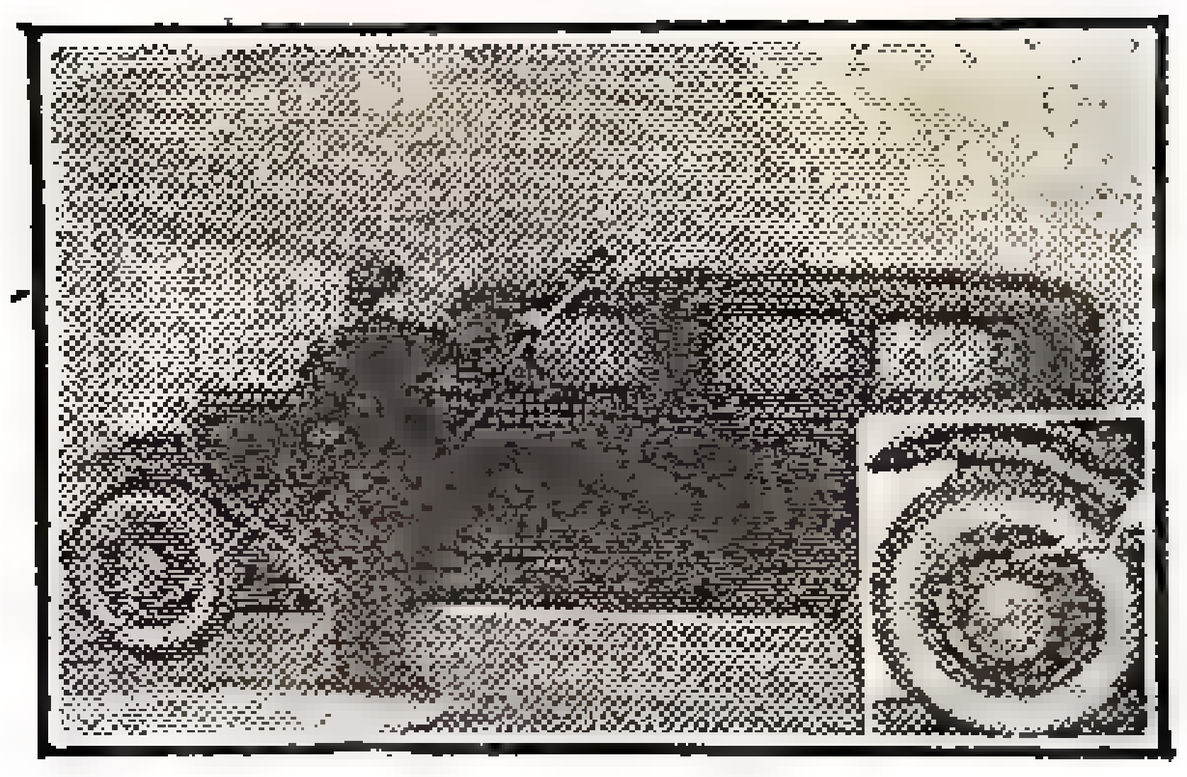

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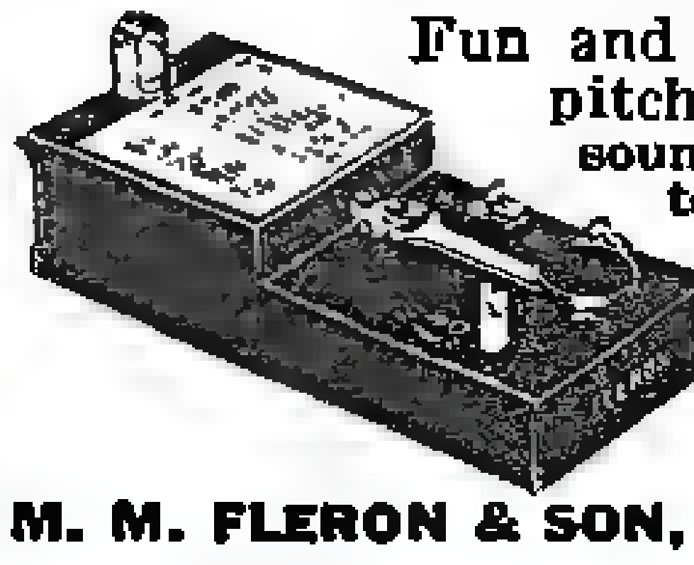

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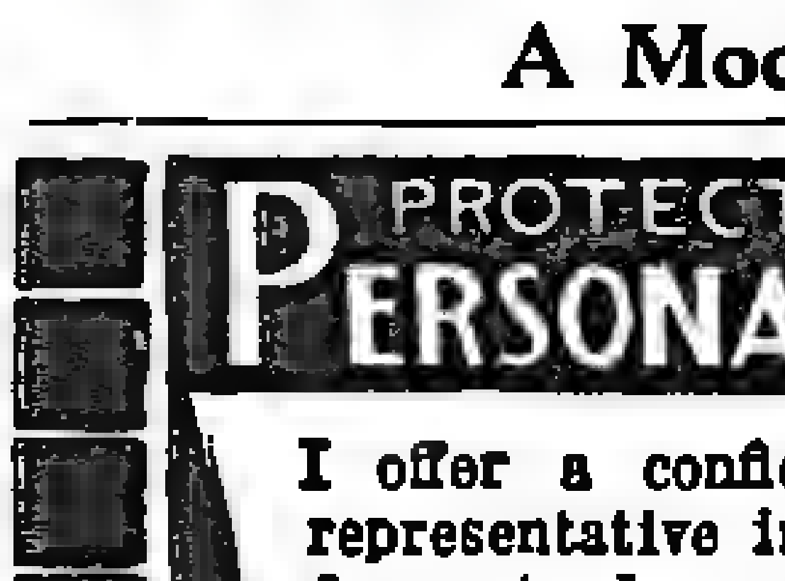

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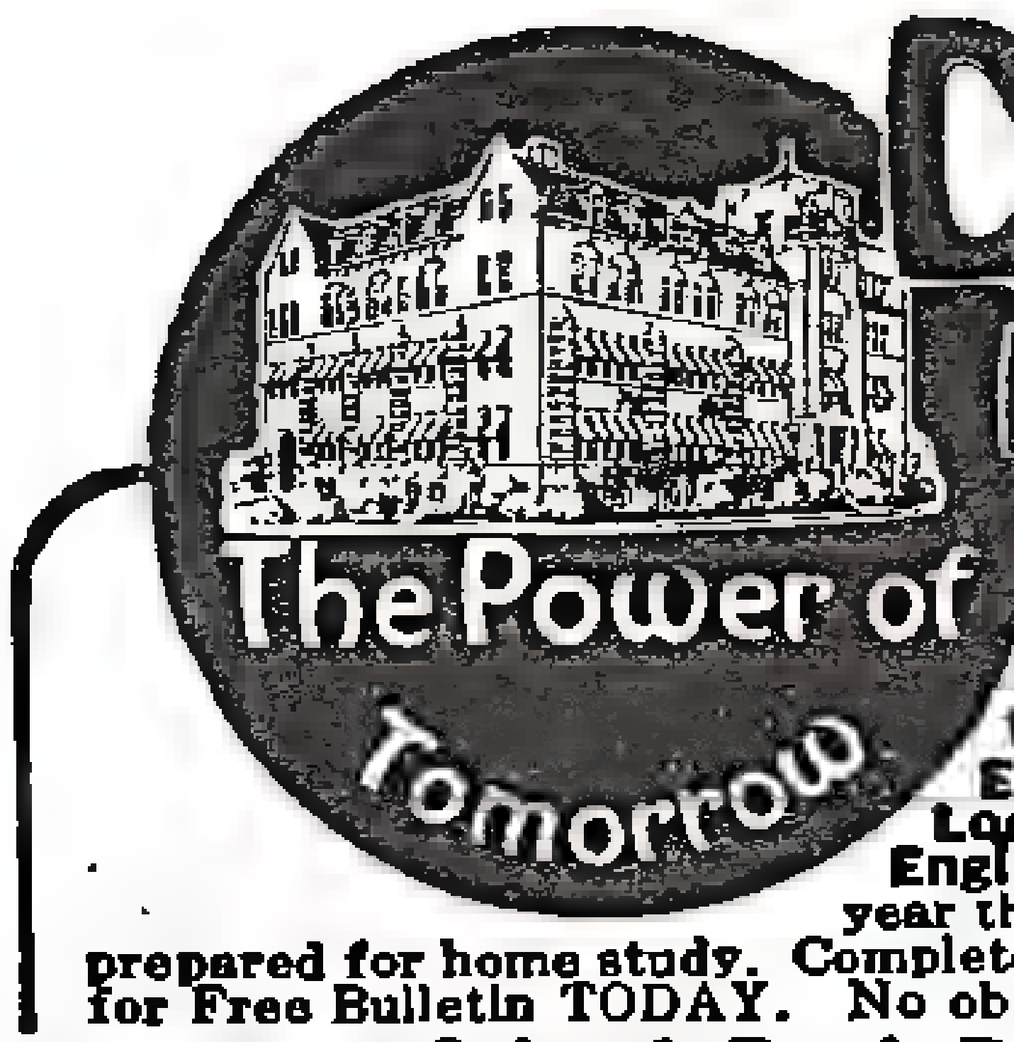

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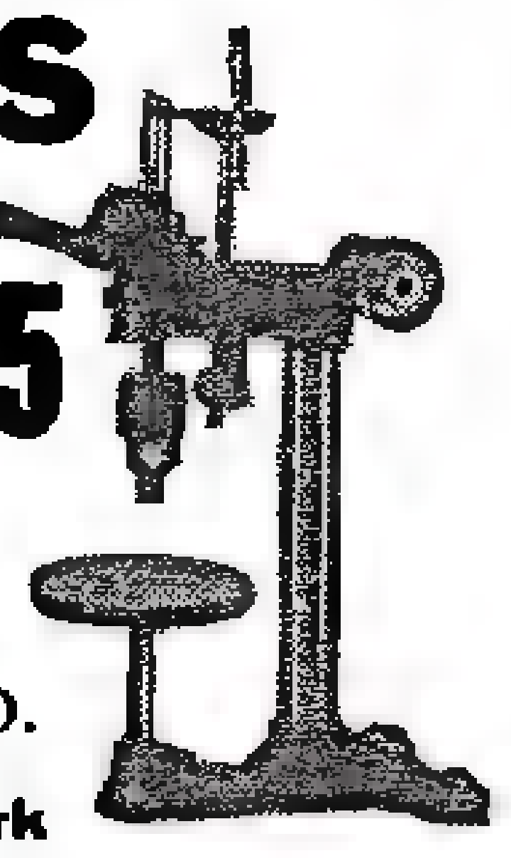

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Turn ACES, KINGS, DEUCES or any other cards face up at will. There is a scientific reason. MOST BAFFLING CARD TRICK just discovered and copyrighted. ABSOLUTELY and POSITIVELY a guaranteed illustrated solution of reading the backs, for 50c (coin).

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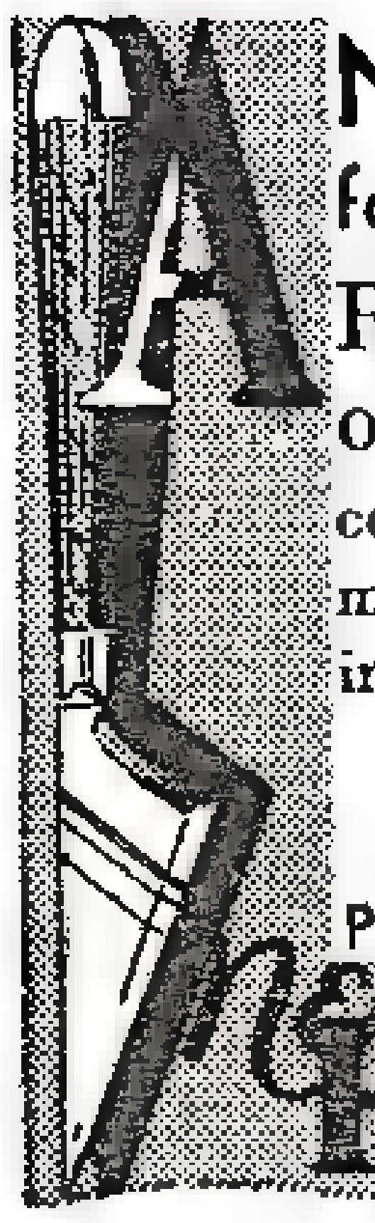

A NEW KIND OF KNIFE
for every KITCHEN, OFFICE, SHOP

Revolutionary.. two cutting surfaces on one side and an extra point in the center. Saves time and effort for housewives, office men, shop workers. Finest steel. Handle fits snugly in hand. Fully Guaranteed. Order today. ONLY $1.00.

(Illustrated descriptive folder sent on request)

HANDY-KNIFE COMPANY
P. O. Box 479 Houston, Texas

New HANDY-KNIFE

NOW YOU SHOULD PREPARE *for* ELECTRICITY

I'll Finance Your Training!

Come to Coyne for 12 weeks—I'll give you a training by the Famous Coyne **"Learn by Doing"** method. Then I'll give you the help of my employment department in getting a real job. I will finance this training for you and you can pay your tuition over a period of 15 months after you graduate.

LEARN IN 12 WEEKS

My training is practical—you learn by working on **real actual electrical machinery** and **not** by books or lessons. We cut out all useless theory and give you the training you need for success in 12 weeks.

This New Age Demands Practical Trained Men

Get ready now for the great new prosperity. Thousands of trained men will be needed. **Thousands of opportunities today.** The new age demands more than ever—men with **specialized electrical training.** Get into **electricity** where you can learn to earn $35 a week and up. **Mail the coupon** today and I'll send you full particulars of my special offer—I'll send you **my big free book** which tells you how many **earn while learning**—my offer of Electric refrigeration course at no extra cost, and all details of my **pay after graduation plan.**

Learn by Doing

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Send me full particulars of your special offer and pay **"Tuition after graduation plan."**

Name.................................

Address.................................

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STRING *your own* RACQUET

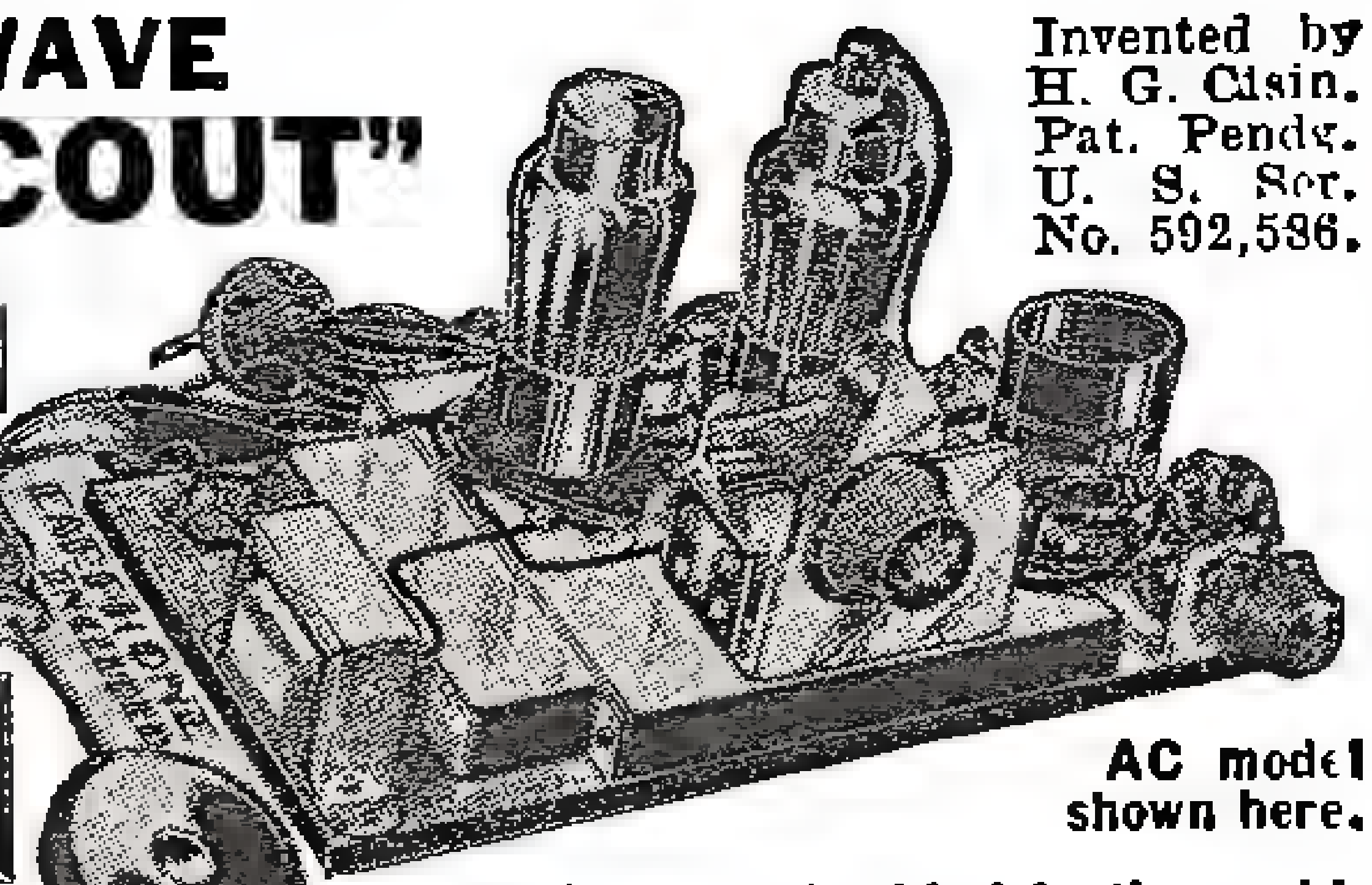
Same Quality String As in Expensive Racquets

Outfit Complete with string, tools and directions $1.65

Easy to restring racquets—better than new. Saves real money. Send for this professional outfit today. Good profits made restringing other players' racquets. 37 ft. string, colors Purple, Green, Red or White—also Scarlet and Black Spiral—with contrasting silk trim, awle, illustrated easy directions. Money back guarantee.

MAKE MONEY TOO! Send check or Money Order $1.65 which includes Postage and Insurance. Sent C. O. D., if desired, 15c extra.

Pro Tennis String Co. Dept. W-5 Harmon, N. Y.



ALL-WAVE "AIR SCOUT"

Invented by H. G. Cisin. Pat. Pendg. U. S. Ser. No. 592,536.

10c to cover printing and postage, brings you valuable data on ALL-WAVE receivers. Send at once.

AC model shown here.

Only set of its kind in the world.

Complete with 2 tubes, earphone, 2 coils covering band from 70 to 550 meters, ready to plug in and use. Postpaid $8.50

Same as above, without earphones. Postpaid...... $8.00

Battery operated ALL-WAVE "Air Scout" complete with tube, earphone, two coils, data instructions, assembled, wired, ready to use. NOTHING ELSE TO BUY except inexpensive batteries. Postpaid $5.95

Same as above, but in kit form. Postpaid...... $5.00

POWERFUL! Operates direct from any house current, AC or DC. Gets all standard broadcast stations, police calls, FOREIGN stations, code and trans-Atlantic phone conversations. Uses 5 plug-in coils, band 10 to 550 meters. Compact, portable, operates several headphone sets simultaneously.

ALL-ELECTRIC sets not available in kit form.

Send check, money-order or bills.

All prices for delivery in U. S. A.

HAMILTON SPECIALTY COMPANY
Dept. Z
135 Lockwood Ave., New Rochelle, N. Y.

New Inventions Speed Business Recovery

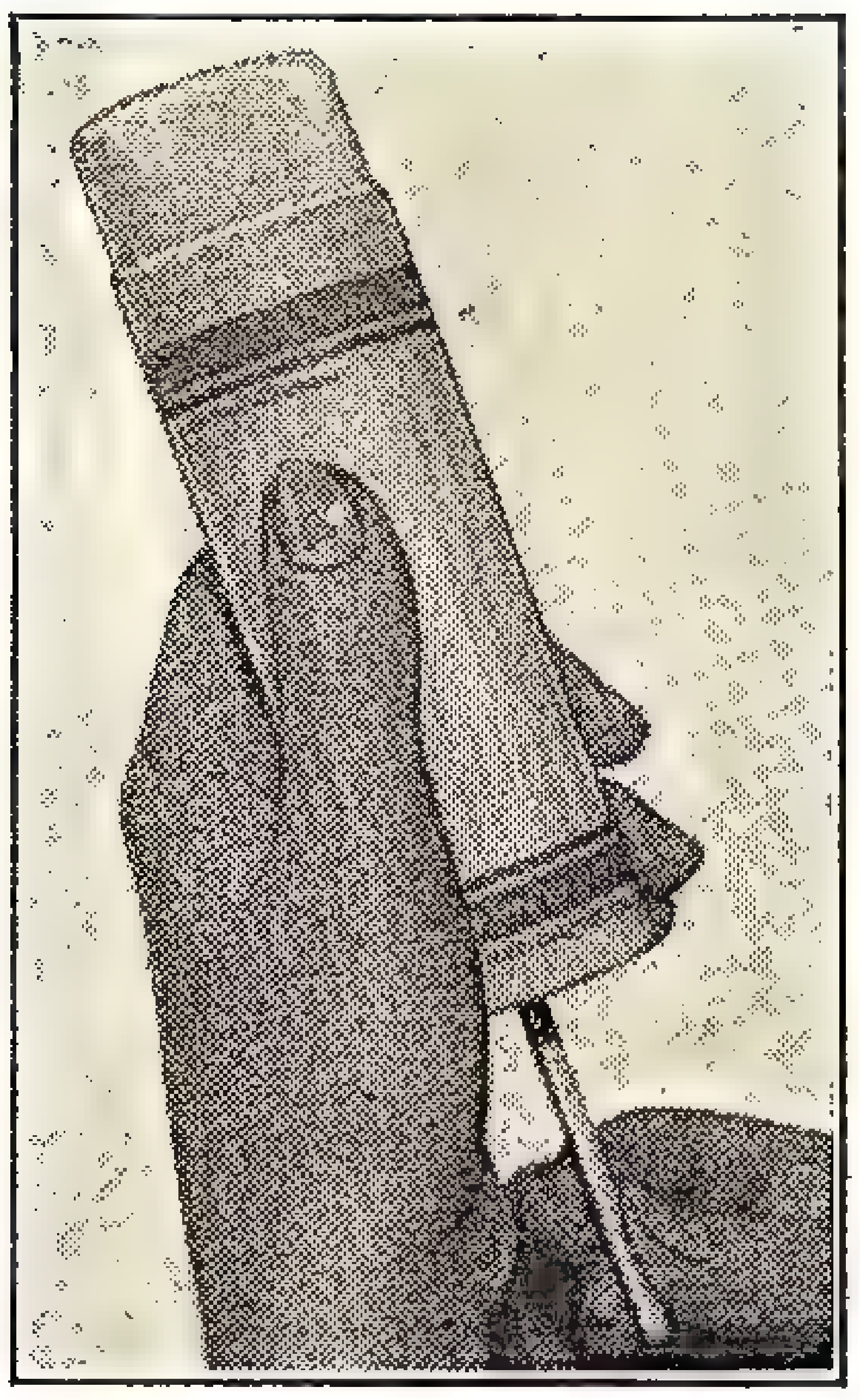
Silvery metal foil cemented to each side of this insulating paper bounces back at least 95% of heat rays coming through walls. Heat is kept out in summer, inside in winter.

An earphone amplifier placed on a stand before any radio loudspeaker brings radio programs to those who are hard of hearing.

An inventor's service bureau brings new inventions to the attention of interested manufacturers before patents have been granted. Needed information is collected from patent attorneys each month.

A laminated bakelite cross-hatching guide for draftsmen eliminates eye strain. Device is easily used with triangle and T-square.

A new radio antenna system is so effective in shielding out man-made interference that an X-ray machine operating in the same building produces a hardly noticeable hum. Special antenna, shielded lead-in, and shielded coupling units are used.



Push on plunger of newest variation of ice cream cone brings out more of contents with no dripping, as with cone.

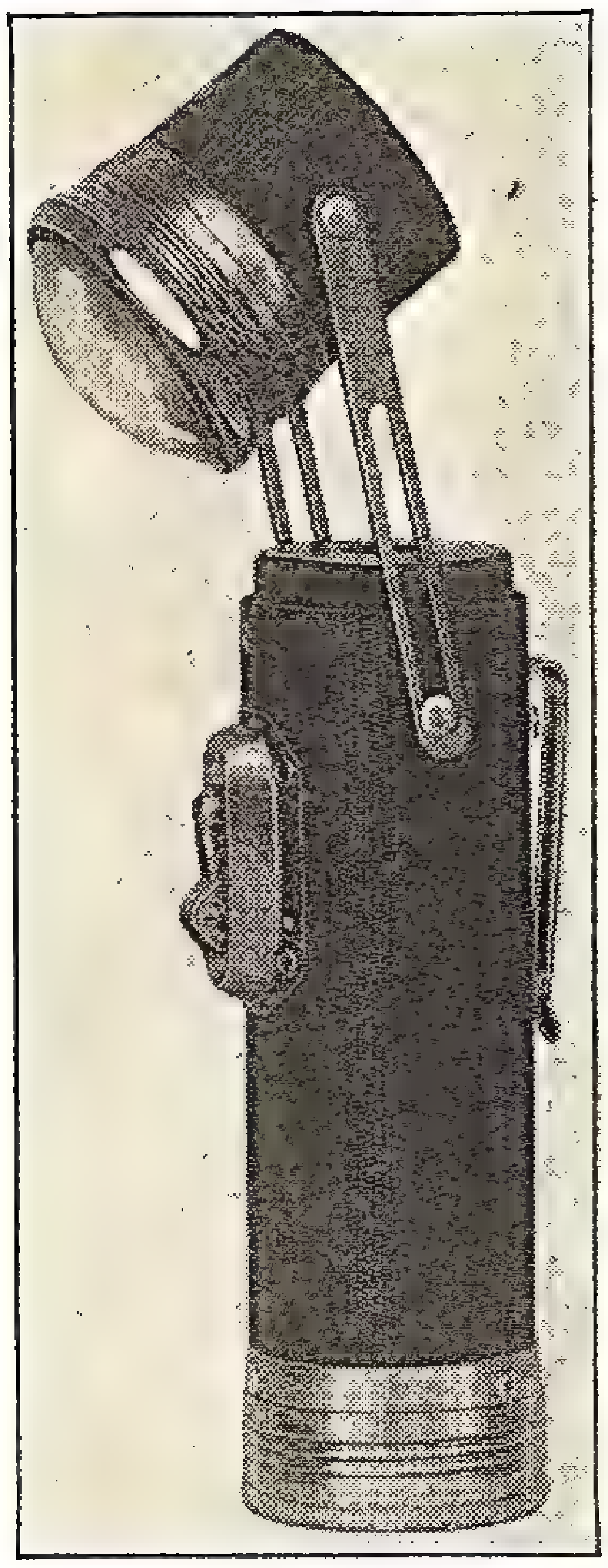
Painless hypodermic injections are possible with a hypojector. At a touch of the tiny trigger a concealed spiral spring forces needle into skin with speed comparable to that of a rifle bullet.

A single lamp bulb with three different possible wattages gives flexible illumination for homes as well as stores. A 100-watt and a 200-watt filament give three combinations.

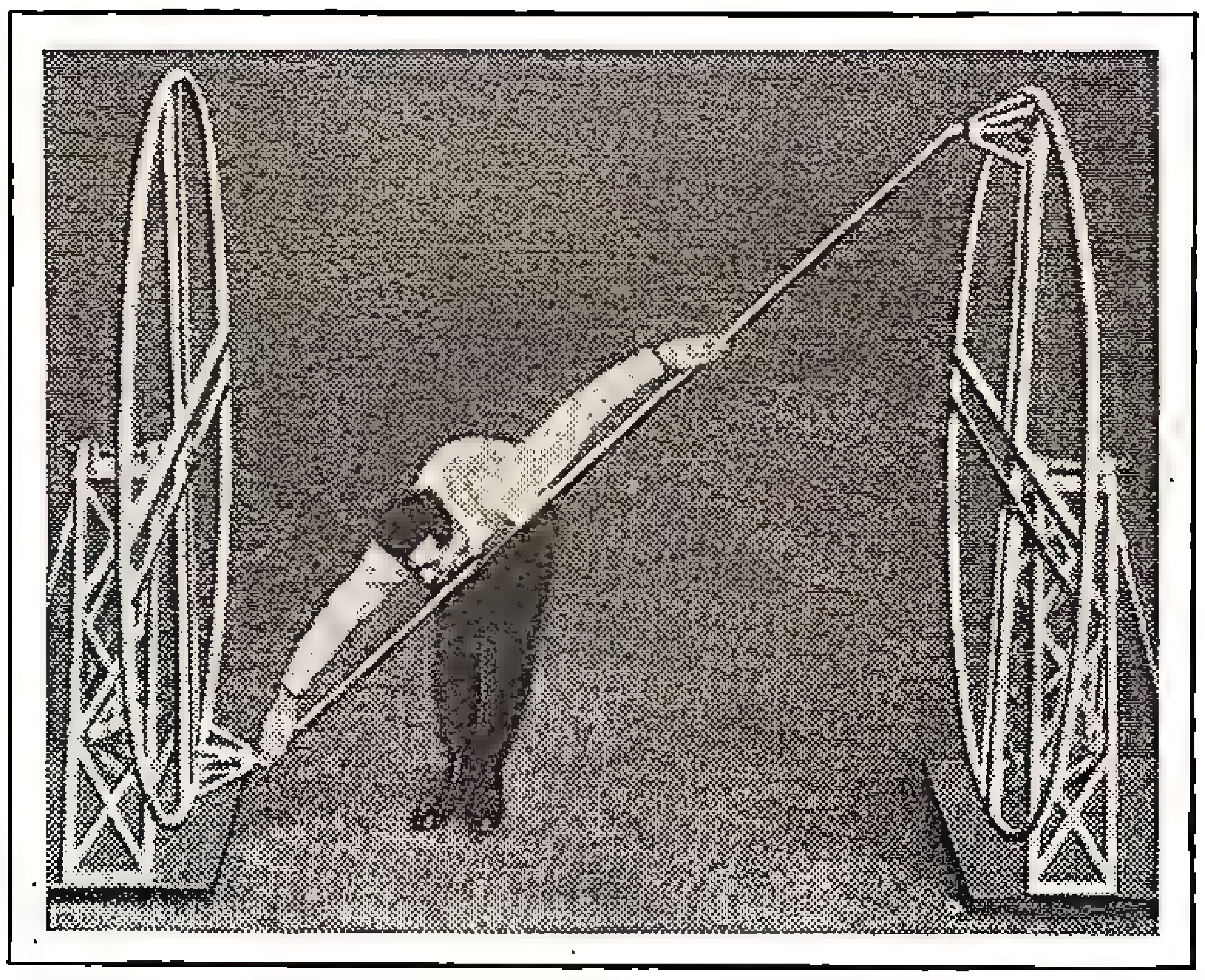
Clothes lines are held firmly in place without tying knots, but released in an instant by a simple little locking device.

Changes in outside wind velocity operate a simple automatic furnace draft control that saves fuel. A mercury balance tube permits fine adjustment for any temperature.

A new window sash lock eliminates entirely the need for weights and sash cord. Requiring the drilling of but one hole, the entire unit is invisible from the outside. Window locks at any height.



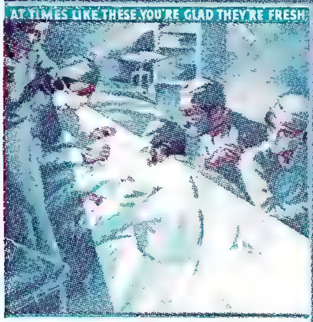
Current is carried by the two side arms to adjustable head of this unique new flashlight. With case standing on end, light may be focused in any direction by tilting the head.



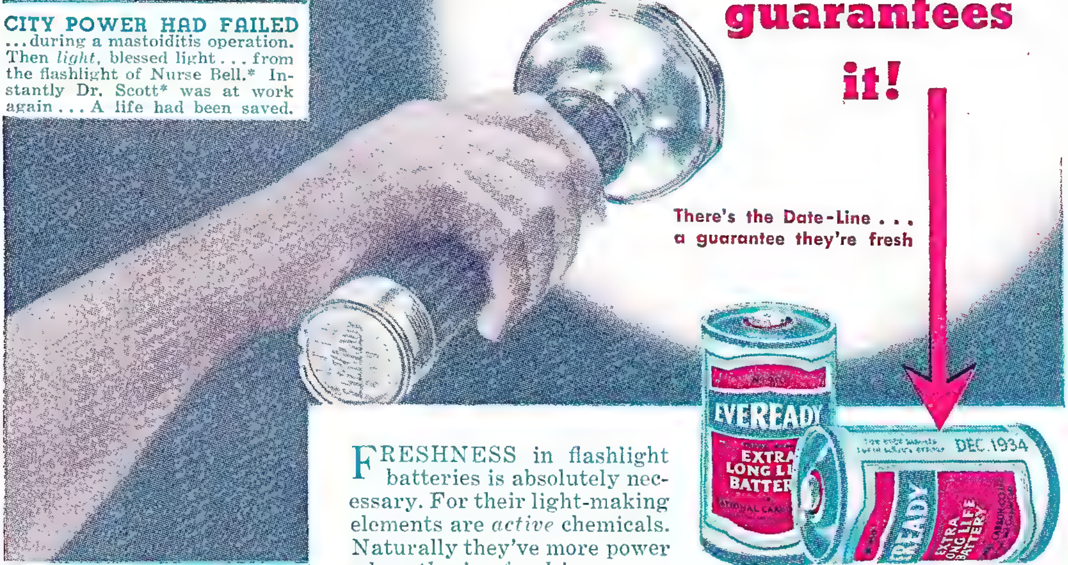
Wheel exerciser now being installed in German gymnasiums. Cross rod changes angle and height as wheels are turned.

Editor's Note—Addresses of manufacturers of these and other new products in this issue can be obtained by sending stamped, addressed envelope to Modern Mechanix and Inventions. *Manufacturers are invited to submit photos and literature for this page.*

THEY'RE FRESH


AT TIMES LIKE THESE YOU'RE GLAD THEY'RE FRESH

CITY POWER HAD FAILED . . . during a mastoiditis operation. Then *light*, blessed light . . . from the flashlight of Nurse Bell.* Instantly Dr. Scott* was at work again . . . A life had been saved.



The "DATE LINE" guarantees it!

There's the Date-Line . . . a guarantee they're fresh

FRESHNESS in flashlight batteries is absolutely necessary. For their light-making elements are *active* chemicals. Naturally they've more power when *they're fresh!*

The "Date-Line" on each Eveready safeguards you . . . proves your dealer's statement that the Eveready he sells *you* is *fresh.*

But the dime you pay for Evereadys buys more than *freshness.* It buys all-armored construction . . . a "power-stabilizer" that holds the scientific mix of powerful light-making chemicals on tip-toe, ready to light . . . and, sealing in freshness, preventing power from leaking away . . . a spun metal top.

Good measure for your dime? Indeed yes. And truly indicative of the expert workmanship in all "Eveready" products. Whenever you buy Evereadys for your flashlight, radio, or motor ignition, you get . . . packaged electricity at its *freshest* and best.

SEE THE UCC EXHIBITS
A CENTURY OF PROGRESS
CHICAGO
1934
HALL OF SCIENCE

AT TIMES LIKE THESE YOU'RE GLAD THEY'RE FRESH

DANGER IN DARK CLOSETS
Your storage closet is unlighted? . . . be careful . . . guard against a bruised head from falling boxes, etc. Use your Eveready.

National Carbon Company, Inc. General Offices:
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Unit of Union Carbide and Carbon Corporation.

NRA

*Not their real names, of course, although their real names were given in the coast to coast newspaper report.

EVEREADY BATTERIES *packaged electricity at its best*

... alone – no
They Satisfy
Chesterfield
Cigarettes
the cigarette that's MILDER
the cigarette that TASTES BETTER

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Double Page Spreads

THE BOOK ON THE NEXT PAGE IS FOR

INVENTORS

AND OTHER MEN WITH IDEAS

SOME of the world's most successful inventions came from men who didn't consider themselves inventors at all. The telegraph was invented by a painter; the typewriter by a farmer; a poet figured out the sewing machine; a school teacher the telephone; a bank clerk the hand camera and a dentist the stock ticker. Or look at small inventions: A husband noticed his wife bending a hair pin to make it stay in her hair. That gave him the idea of the crinkly hair pin, which he proceeded to patent. One day a golfer got the idea —just a hunch —to make a wooden tee. He patented his idea —and every golfer knows that wooden tees are sold by the millions every year. These are but a few of many similar examples in inventive history.

That is why we say that the book shown on the next page is for INVENTORS and Other Men with IDEAS. Some men make a business of invention. They make their living —even fortunes—that way. Other men who are not inventors at all occasionally have good, practical inventions which could be patented to their profit and with benefit to the world.

Whether you consider yourself an inventor or not—if you have a good invention; an invention that will save money, save time, save labor, make money or give pleasure—you should at least find out how you can protect your rights to it. And this interesting, new FREE book, PATENT PROTECTION, will tell you.

Read What C. F. KETTERING Vice-Pres. General Motors says about Invention

Sometimes we hear people say: "Well, there isn't much left to invent." But Charles F. Kettering, Vice President and Head of Research of General Motors, who helped develop the self-starter, Duco, and many other outstanding inventions, **doesn't think that at all.** He thinks just the opposite. In an interview published in Good Housekeeping Magazine, Mr. Kettering said:

"If we took half the men employed in tool making and put them to working out new inventions, new things, we could snap out of this depression in no time. Our return to normal times depends on new manufactured products that will catch the purchaser's eye, get him to buy and thus start the ball rolling. Change and buying go together. ***We're only entering the great period of inventive advancement."***

Our Business Is To Help Inventors

For thirty-five years, this organization has been in the business of helping inventors. During that time ideas—inventions—from literally every corner of the country have been turned over to us to protect. Some of these ideas have represented large and complicated mechanisms; many others have been very small, practical articles, like a can opener or a new toy.

All this has given us a wealth of experience which we place at the use of the inventor of today. What you write us is held in strictest confidence. Here in Washington, near the U. S. Patent Office, we maintain a large staff of experienced Patent Specialists, Draftsmen and Specification Writers to give you prompt and competent service. Yet because we know how to work efficiently—our fees are low; and if desired we are in position to help you with a plan of deferred payments.

Delays May Be Costly—Write Us Today

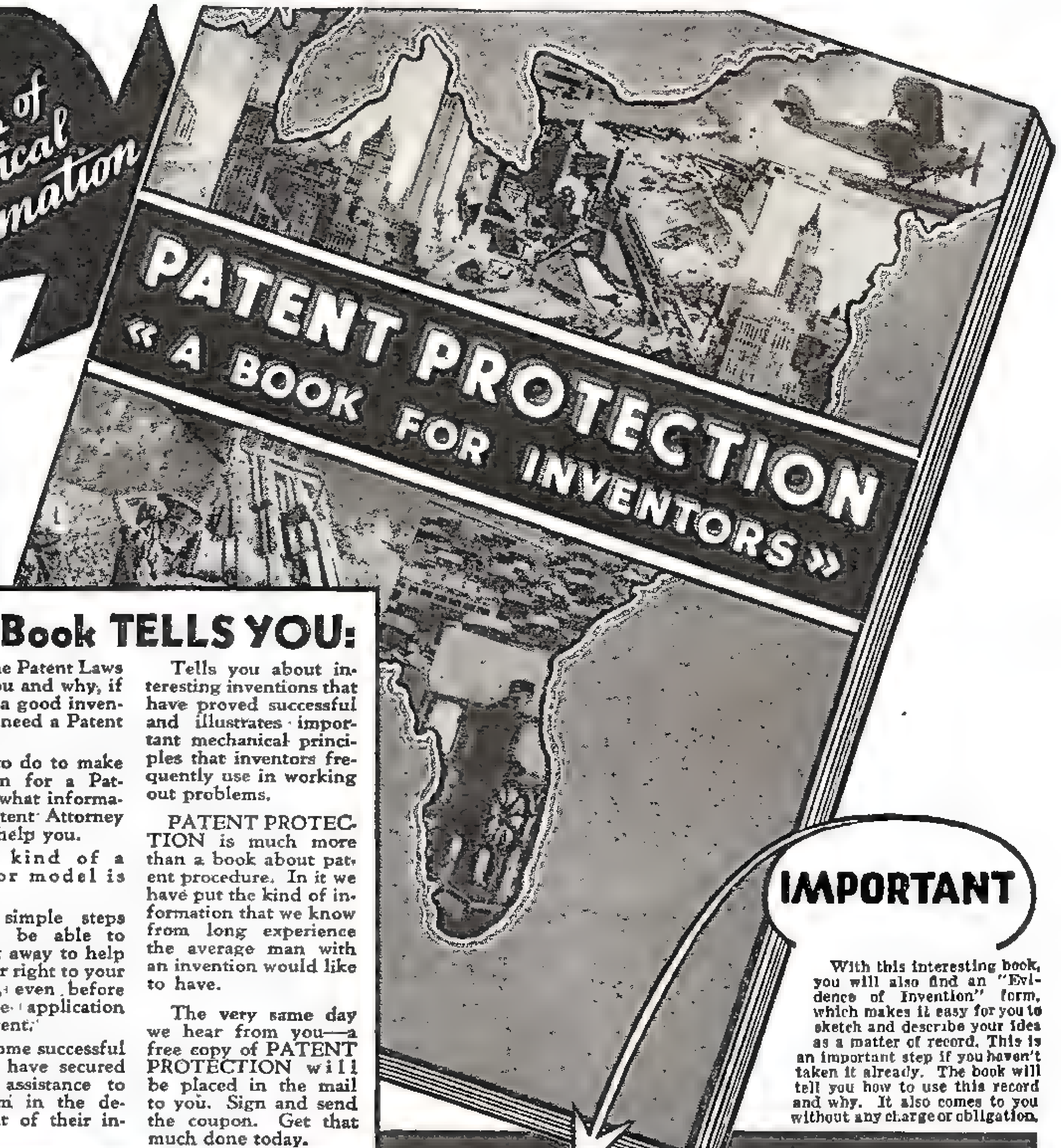
In inventive matters, delays can often prove very costly. It frequently happens that two or more inventors will be working on substantially the same invention without each other's knowledge. And the Patent Office rules place the burden of proof on the man who gets his Patent Application on file last. So if you have an idea —YOUR VERY FIRST STEP is to find out exactly what to do to protect yourself. That is a step you can take today—right away in fact —by sending for your copy of PATENT PROTECTION.

Many Little Ideas Have Big Commercial Possibilities

Every year thousands of patented new articles are brought on the market—the result of someone's happy thought. Often it is these little, simple inventions—the kind you find on the counters of a 10c store like the one shown here—that are among the most successful financially. Whether your invention is simple or complex—large or small—if it is new and useful, you owe it to yourself to find out how you can protect it. Send for a FREE copy of the book, "Patent Protection," NOW.

VICTOR J. EVANS & CO.

48 Pages of Practical Information



This Book TELLS YOU:

How the Patent Laws protect you and why, if you have a good invention, you need a Patent at all.

What to do to make application for a Patent; just what information a Patent Attorney needs to help you.

What kind of a sketch or model is needed.

What simple steps you may be able to take right away to help claim your right to your invention, even before you make application for a Patent.

How some successful inventors have secured financial assistance to help them in the development of their inventions.

Tells you about interesting inventions that have proved successful and illustrates important mechanical principles that inventors frequently use in working out problems.

PATENT PROTECTION is much more than a book about patent procedure. In it we have put the kind of information that we know from long experience the average man with an invention would like to have.

The very same day we hear from you—a free copy of PATENT PROTECTION will be placed in the mail to you. Sign and send the coupon. Get that much done today.

IMPORTANT

With this interesting book, you will also find an "Evidence of Invention" form, which makes it easy for you to sketch and describe your idea as a matter of record. This is an important step if you haven't taken it already. The book will tell you how to use this record and why. It also comes to you without any charge or obligation.

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I am interested in your book, PATENT PROTECTION and your "Evidence of Invention" form. Please send both of them FREE and without obligation on my part.

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Street and No. ....

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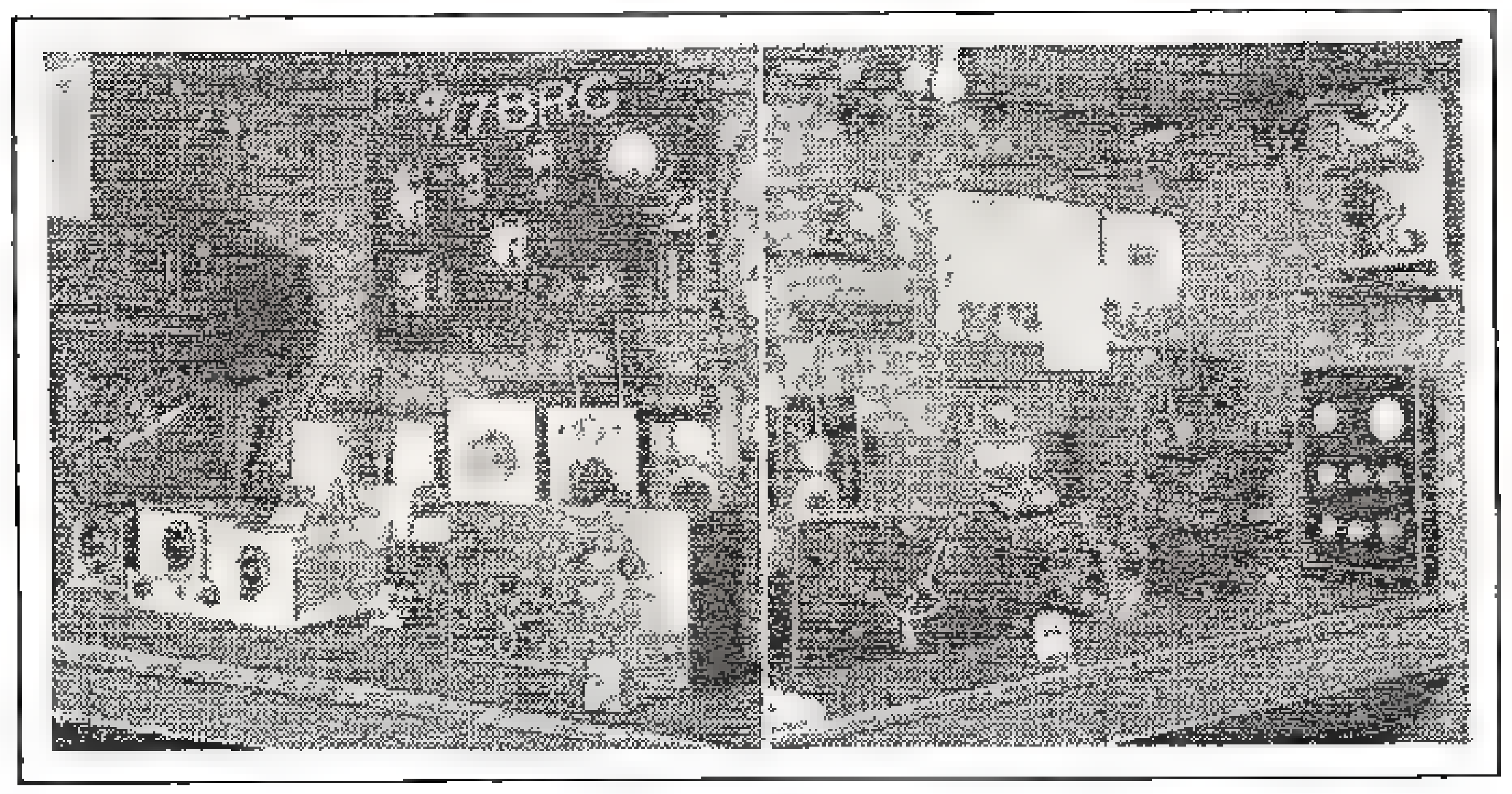
(Be Sure to Write or Print Name Carefully)

605 J-VICTOR BLDG., WASH. D. C.

RANDOM CHIPS from the Editor's WORKBENCH

Here our readers tell what they are doing. This month's stack of letters reveals boy, just 14, who flies, explores under water and speeds over ice with MM projects.

$10.00 IN PRIZES EACH MONTH FOR PICTURES. Read details, then send your photo to the Workbench. Here are the Radio Contest winners.



MM's Radio Sparks helped A. E. McDonell, of Spokane, Wash., build station W7BRG, shown above, and win first prize in radio photo contest. The station walls are decorated with more than 700 QSL cards.

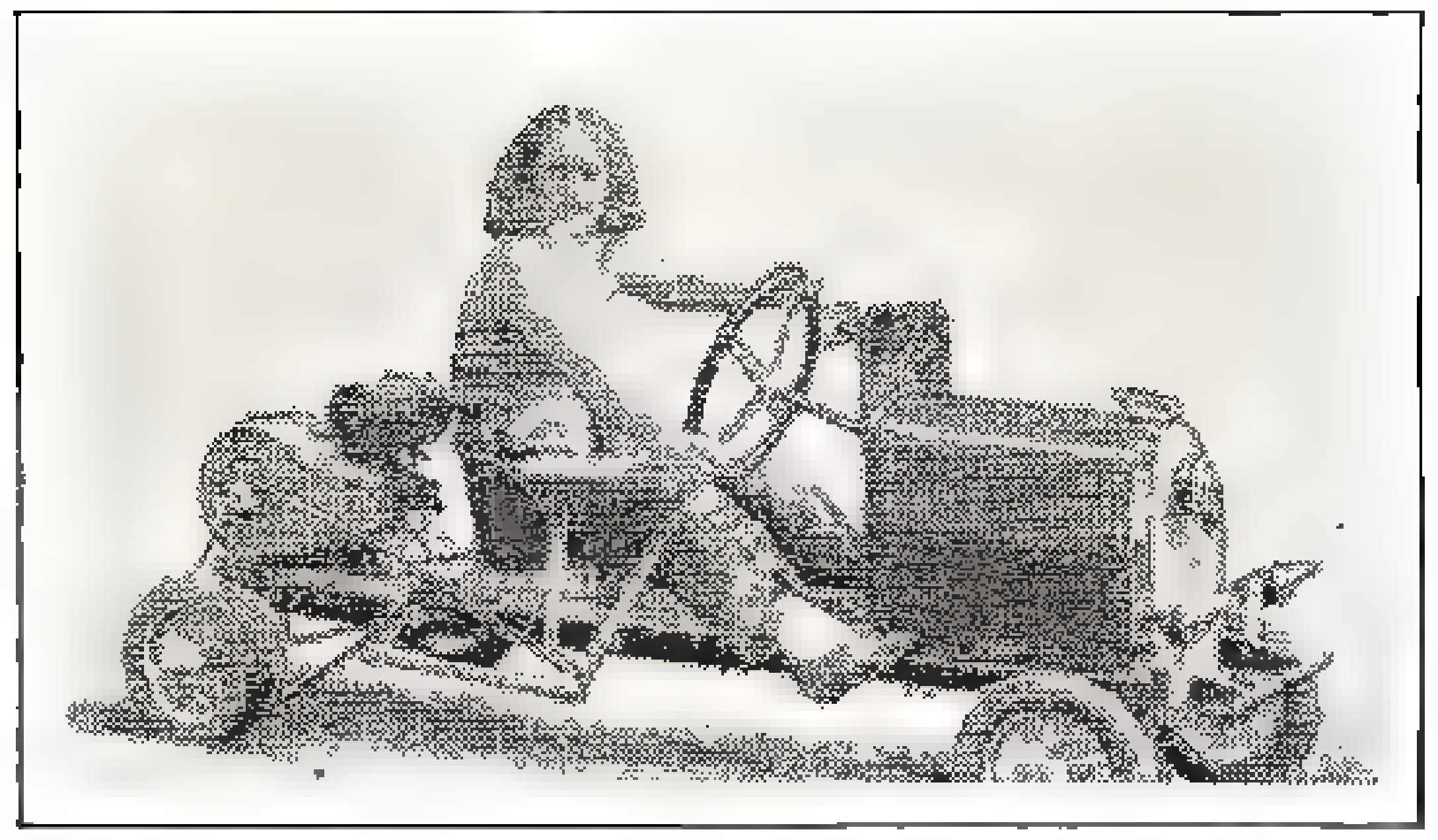
RADIO "hams" swamped the Workbench with photos of their outfits for the radio picture contest announced in the May issue. After hours of careful selection and elimination, the judges found two which were considered the best.

First prize of $5.00 was awarded to A. E. McDonell, of Spokane, Wash. His amateur station, W7BRG, is jammed with kinks and sets from MM's Radio Sparks department. McDonell says:

> Dear Editor: Spokane, Wash.
>
> Here's a picture of my set up. Some of the ideas I got out of your magazine. I had to take two shots to get all the station.
>
> A. E. McDonell.

* * *

Size of outfits did not influence the decisions of judges. That is the reason second prize of $3.00 was awarded for photos of a short wave adapter. Stanley C. Mosher, of Chicago, won the prize with a police call box described in the March, 1933, issue of Modern Mechanix and Inventions. Here's part of Mosher's letter:



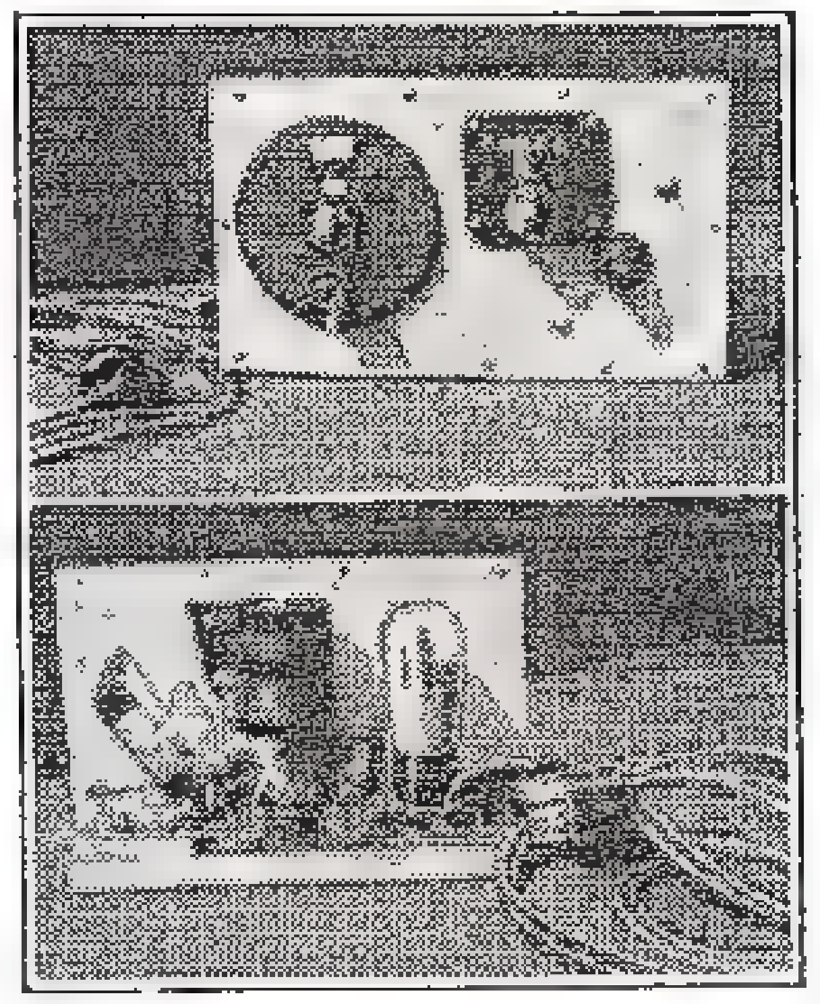
This midget car has a one-horse motor and will do 24 miles per. J. B. Handy offers to give MM readers details.

> Chicago, Ill.
>
> Dear Editor:
>
> Herewith are two snapshot views of the short wave adapter that was in your March, 1933, issue.
>
> The first station brought in was an amateur in Columbus, Ohio, without any antenna on my six-tube midget set.
>
> This was my first attempt at building a short wave set.
>
> Stanley C. Mosher.

* * *

For an indefinite period the Workbench will award three prizes for the three best photos published in these columns each month. This monthly contest is open to all readers. Photographs of anything you have built are eligible.

All you have to do is snap a picture and send a print to the Workbench. Don't forget to send a brief letter along. The more interesting the letter, the better chance you will have. Each contest will close on the fifteenth of the month of the issue of the magazine. That is, the contest for this issue will close August 15. Entries received after that, however, will not be thrown out, but will be judged in the next month's contest. First prize is $5, and $3 will be awarded to the second best photo submitted, while the third prize is $2.



Stanley C. Mosher's photos of his police call box won second prize in radio photo contest.

Send all photographs to The Editor's Workbench, Modern Mechanix and Inventions, 529 S. 7th St., Minneapolis, Minn. All photographs submitted are the property of Modern Mechanix for use in these columns.

* * *

And here's a young man, just 14 years old, who flies through the air, speeds over ice, and explores under water. He knows how to use a hammer and a few other tools and found interesting things to build in MM. But let him tell the story:

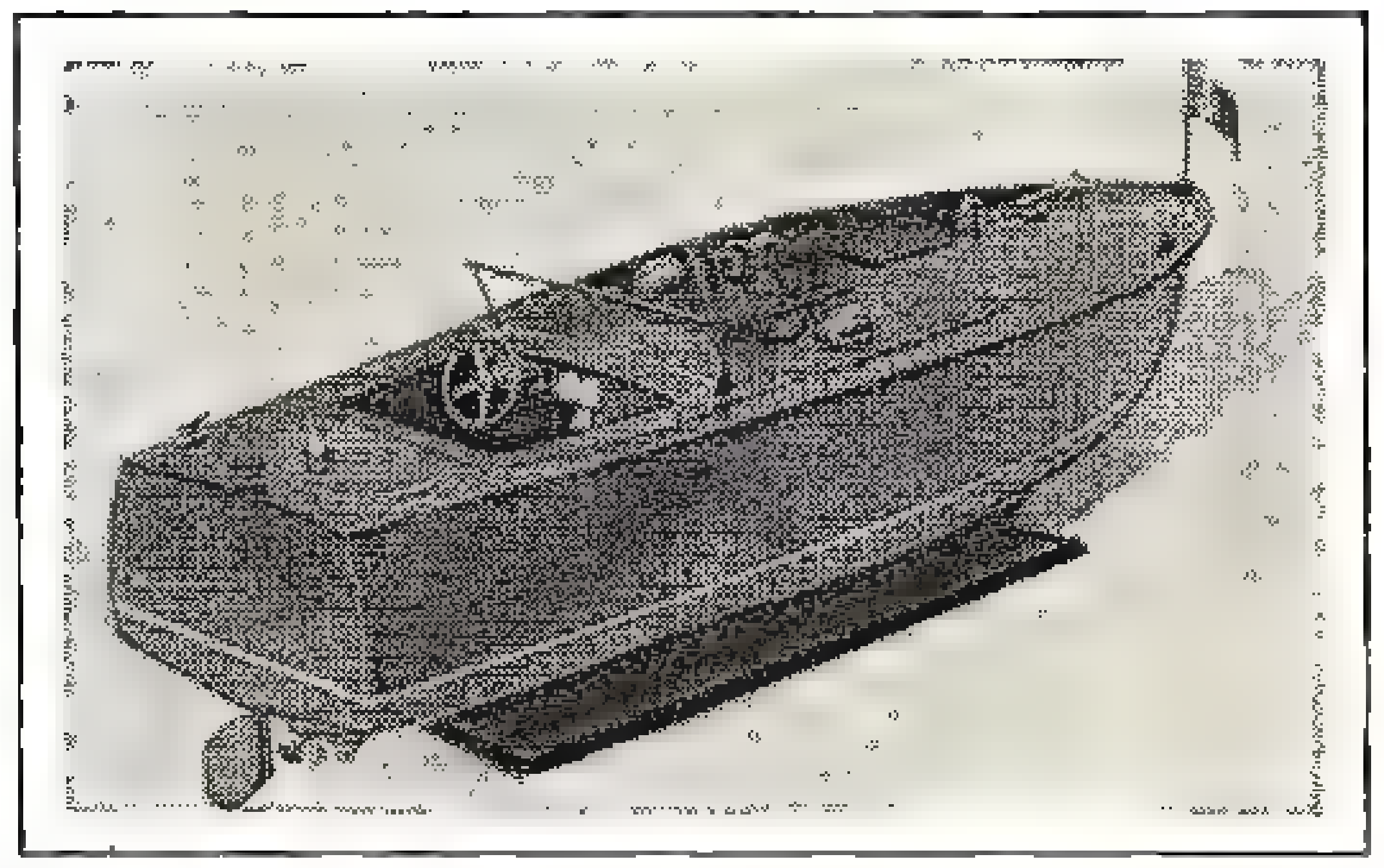
> Clearfield, Pa.
>
> Dear Editor:
>
> A faithful reader of MM I am and I haven't missed a flying manual since 1930. That's where I got the plans from which I built the glider. Remember that Northrop training ship? (We do. It's in the 1930 Manual.) A good landing gear and a small cut down in size are all the changes she got.
>
> That iceboat in the picture is the one published by MM plus the usual change. This time it's the sail. She folds up for transportation.
>
> The diving helmet is of my own design. Although I am only 14 years old I can travel on ice, under water and through the air and my next will probably be a midget car.
>
> Walter Schaefer.

There is no doubt about Walter being a real boy. Here's hoping for more pictures from Walter and other boys like him.

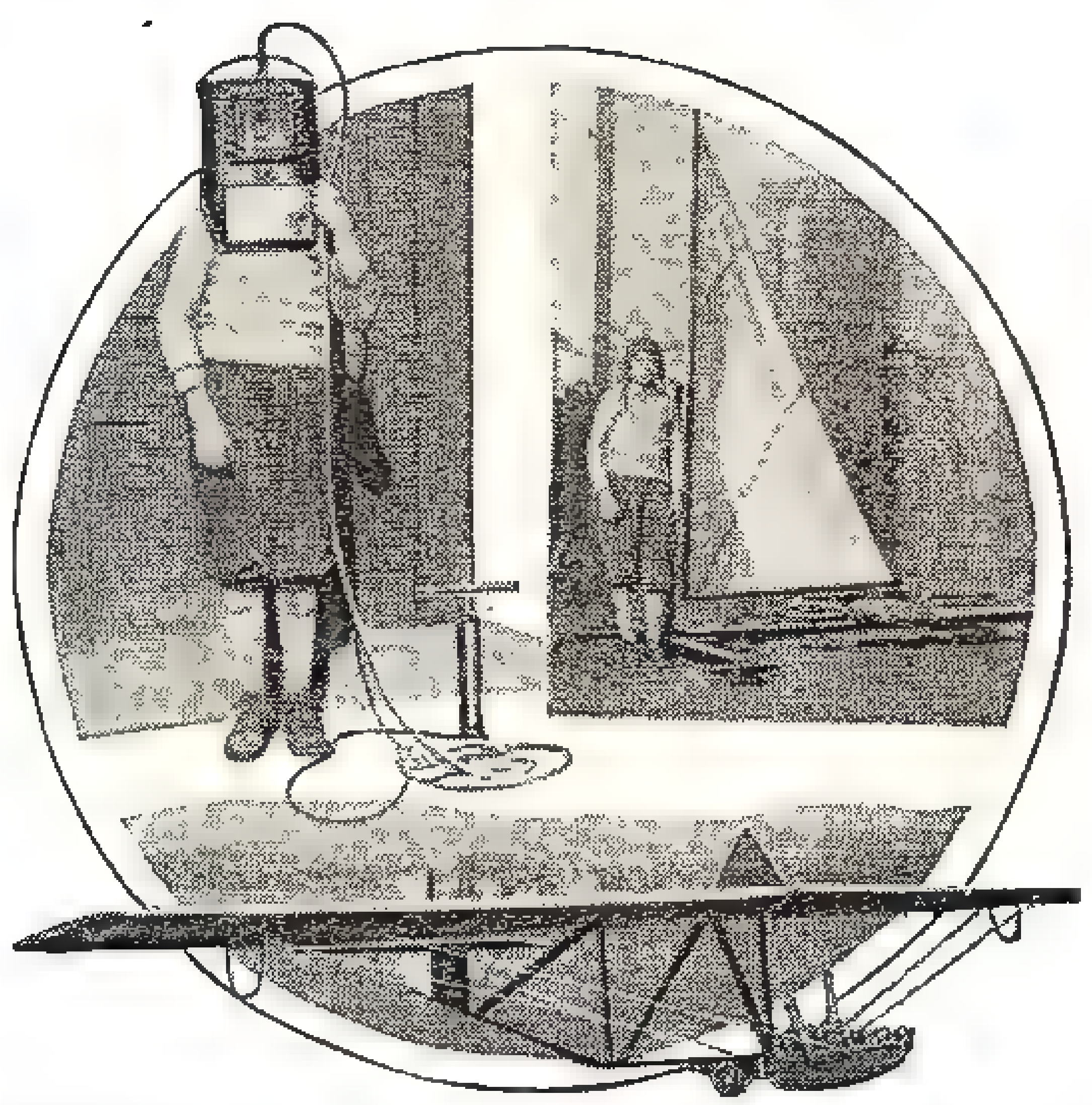
* * *

Another of our readers offers to help any one wanting to build midget cars. Now is the time for the "auto babies." If you are interested, glance over this letter:

> P. O. Box 737 Lynchburg, Va.
>
> Dear Editor:
>
> And still another midget car, although this one is big enough to be of some good. It's weight is exactly 200 pounds and it will carry more than its weight up a 15 per cent grade. 'Tis powered by a one-horse Nelson Jumbo motor; the rear axle runs on ball bearings and is mounted on rubber; the clutch should look familiar; the brake is external contracting and is actuated by the same lever.



Here is Dean Pittenger's quarter size version of Doane's Hydrobout. He had five months of fun building the model.



Walter Schaefer (hidden under diving helmet) has had more adventures than many older men with his glider, ice boat and diving outfit. He followed MM plans to build them.

> The cost was plenty. However, the speed is 24 miles per on level and 'tis strong enough for two youngsters of 120 lbs. each to go all over town in together.
>
> I will be glad to give detail information to any one upon request. Although an industrial engineer, and so receiving at my desk dozens of magazines, yours brings the most pleasure in my spare hours.
>
> J. B. Handy.

In writing to Handy, don't forget that stamped, addressed envelope for reply and that reminds us that some of you slip up on this point when sending inquiries to MM's many departments.

* * *

Dean Pittenger has found a novel use for How to Build Twenty Boats. Instead of building the full size boat, Pittinger carefully builds a scale model. This is what he says about the little boat pictured this month:

> Los Angeles, Calif.
>
> Dear Editor:
>
> There she is. Five months of a lot of fun. A one-quarter size version of Doane's Hydrobout. She is built exactly to scale. Spruce frames, mahogany planking and put together with screws throughout.
>
> The engine is one-cylinder, 4-cycle made by a friend of mine. It's his own design.
>
> She goes about 10 to 12 miles an hour with door bell batteries fo rthe spark coil.
>
> I will be glad to answer any questions regarding either boat or engine.
>
> Dean Pittenger.

TAKE ME OUT!!
??
HELP!!
LET ME GO!
LOAFER

BOYS! BOYS! BOYS!

Throw Your Voice

Into a trunk, under the bed, under a table, back of the door, into a desk at school, or anywhere. You get lots of fun fooling the teacher, policemen, peddlers, and surprise and fool all your friends besides.

THE VENTRILLO

is a little instrument that fits in the mouth out of sight. Cannot be detected. It is used in connection with the above, and with the aid of this wonderful DOUBLE THROAT, or VENTRILLO, you can imitate all kinds of birds, animals, etc. Remember you get everything for ONLY TEN CENTS—a booklet giving you full instructions how to become a ventriloquist and throw your voice, the Double Throat, or Ventrillo, also a copy of our MONTHLY MAGAZINE, "FUN, MAGIC AND MYSTERY." **ALL FOR ONLY 10 cents.** *Johnson Smith & Co., Dept. 719, Racine, Wis.*

MAKEYOUROWNRADIO

Enjoy the concerts, baseball games, market reports, latest news, etc. This copyrighted book "EFFICIENT RADIO SETS" shows how to make and operate inexpensive Radio Sets, the materials for which can be purchased for a mere trifle. Also tells how to build a short-wave Receiver for bringing in foreign stations, police calls, ships at sea, etc. **ONLY 15c p.pd.**

MIDGET BIBLE

GREAT CURIOSITY Smallest Bible in the World. Size of a postage stamp. 200 Pages. Said to bring good luck to the owner. A genuine work of art. Must be seen to be appreciated. Make good money selling them to friends, church acquaintances, etc. PRICE 15c each, 3 for 40c, 12 for $1.35, 100 for $7.50. Also obtainable in Leather Binding, with gold edges. **Price 50c each, 3 for $1.25, $4.50 per doz. Magnifying Glass for use with Midget Bible 15c**

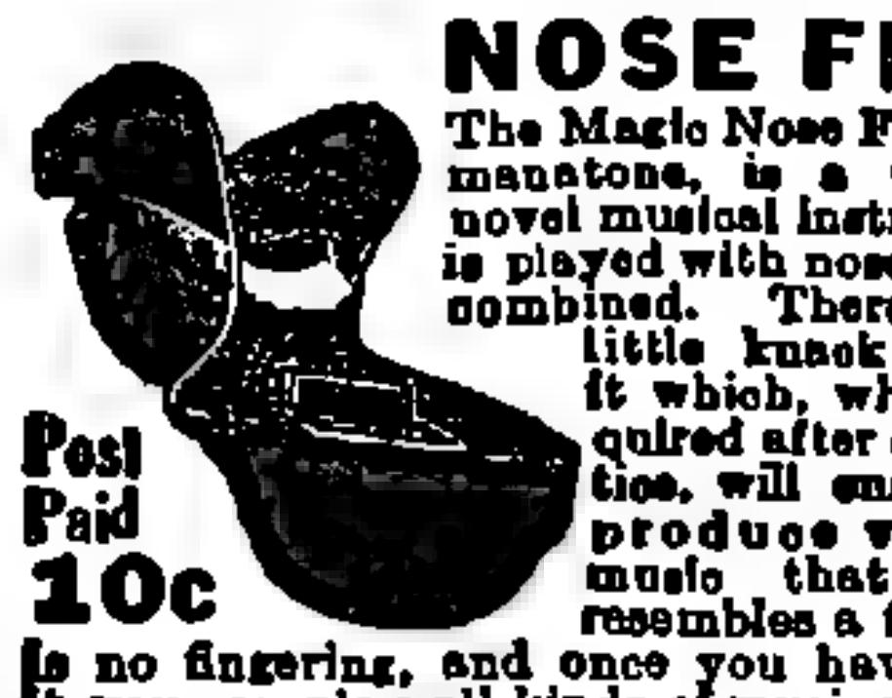
SERPENT'S EGGS

Box contains 12 eggs. When lit with a match, each one gradually hatches itself into a snake several feet long, which curls and twists about in a most life-like manner. **Price per box. 10c postpaid. 3 for 25c.**

STAGE MONEY

With a bunch of these bills, it is easy for each person of limited means to appear prosperous by flashing a roll of these bills at the proper time and peeling off a genuine bill or two from the outside of the roll, the effect created will be found to be all that can be desired. **Prices, postpaid: 40 Bills 20c, 120 for 50c, or $3.50 thousand postpaid.**

NOSE FLUTE



Post Paid 10c

The Magic Nose Flute, or Humanatone, is a unique and novel musical instrument that is played with nose and mouth combined. There is just a little knack in playing it which, when once acquired after a little practice, will enable you to produce very sweet music that somewhat resembles a flute. There is no fingering, and once you have mastered it you can play all kinds of music with facility and ease.

JOHNSON SMITH & CO.

250 MAGIC TRICKS

MAGIC MADE EASY

An excellent little book containing nearly 300 tricks for parlor or stage that anyone can do. Tricks with cards, coins, handkerchiefs, eggs, bottles, string, etc. Also Second Sight, Shadowgraphy, etc. Profusely illustrated. **10c postpaid.**

125 CARD TRICKS and sleight of hand. Contains all the latest and best card tricks as performed by celebrated magicians, with exposure of card tricks used by professional gamblers. **Price 25c postpaid.** Coin or stamps.

SURPRISE MATCHES

More fun than fighting with your wife. Look just like ordinary matches. As the victim tries to light one he gets quite a surprise. **10c**

Price 10c per box, 3 boxes for 25c, 12 for 75 cents.

STAR TOY MAKER

Greatest boys' book written. Tells how to make a Pinhole Camera, a Canoe, model Railroad, a Telephone, Boomerang, Telegraph Instrument, Box Kite, Talking Machine, Microscope, Electric Motor, Electric Door Bell, Water Wheel, Paddle Raft, a pair of Skis, a Dog Sled, Bird House, Rabbit Yard, etc. 64 pages. 160 illustrations. **PRICE 10c.**

BOY'S OWN TOYMAKER. A new book. Tells how to make chemical toys, electrical toys, galvanic toys, mechanical toys, paper toys, cardboard toys, boats, traps, etc. 200 illustrations. **Price 25c postpaid.**

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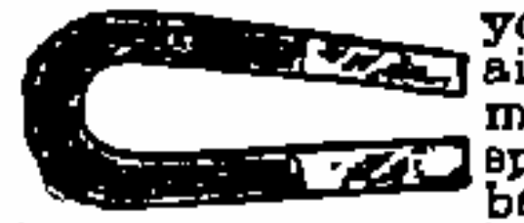

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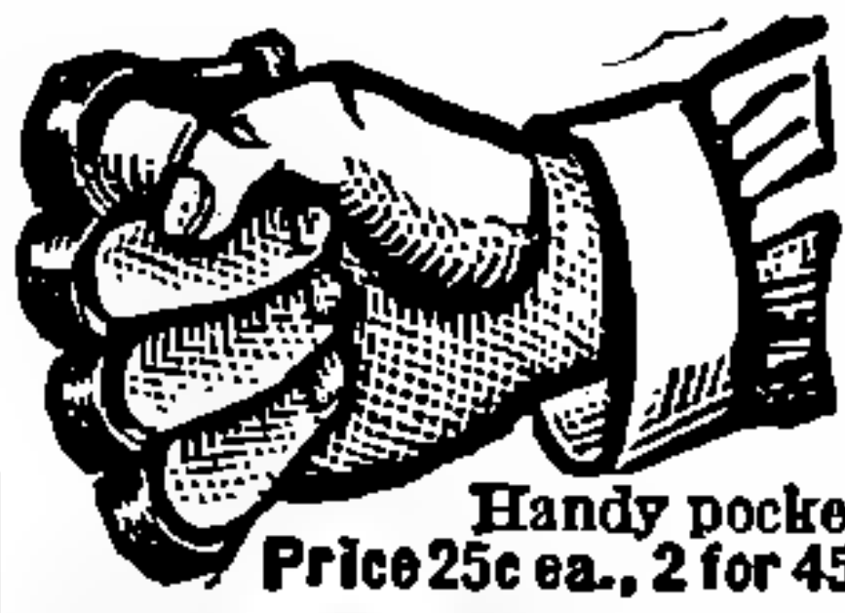

Used by police officers, detectives, sheriffs, night watchmen and others as a means of self-protection. Very effective. Easily fits the hand, the fingers being grasped in the four holes. Very useful in an emergency. Made of aluminum they are very light, weighing less than 2 ounces. Handy pocket size always ready for instant use. **Price 25c ea., 2 for 45c postpaid.** *770 page Catalog 10c.*

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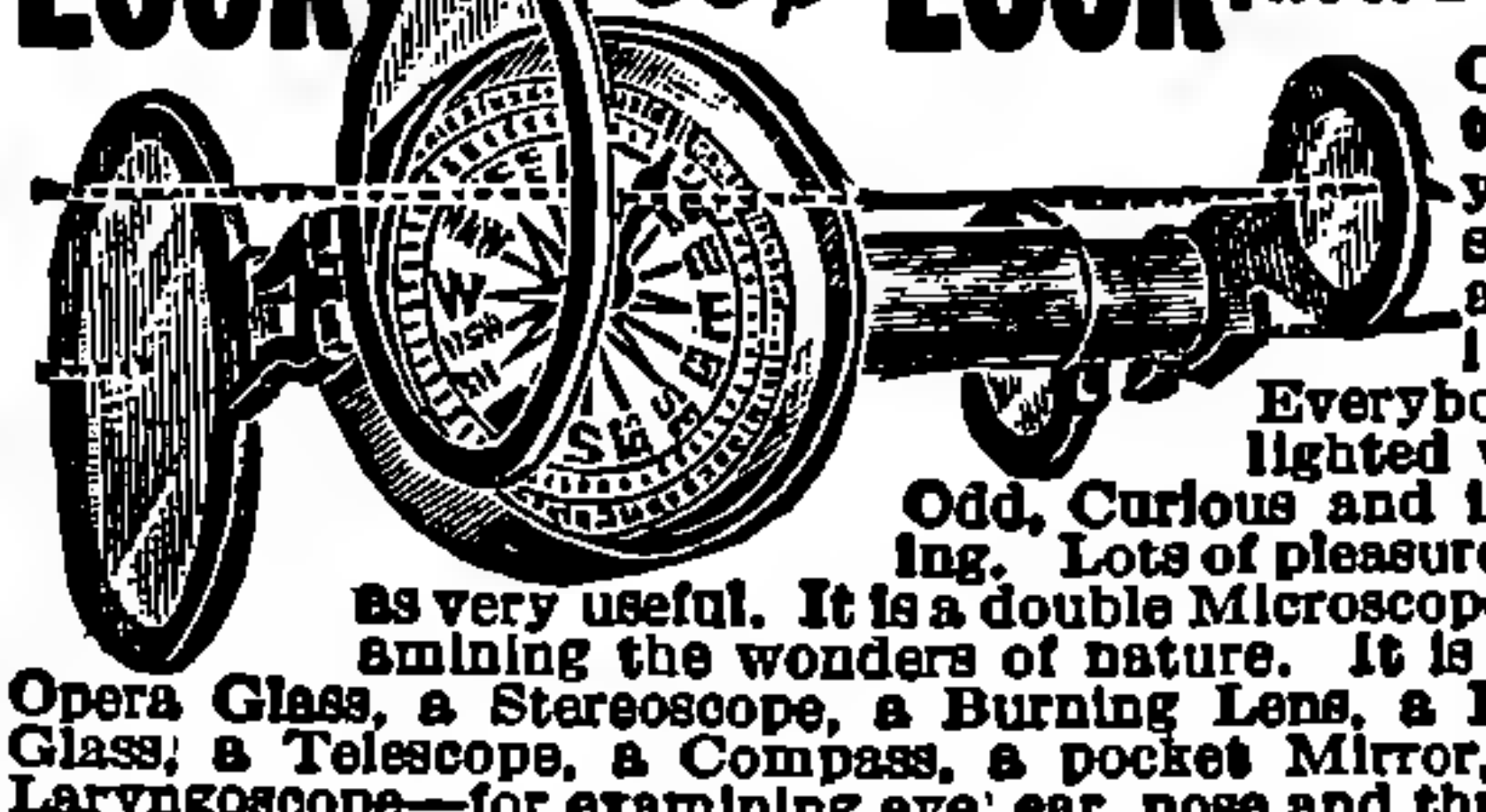

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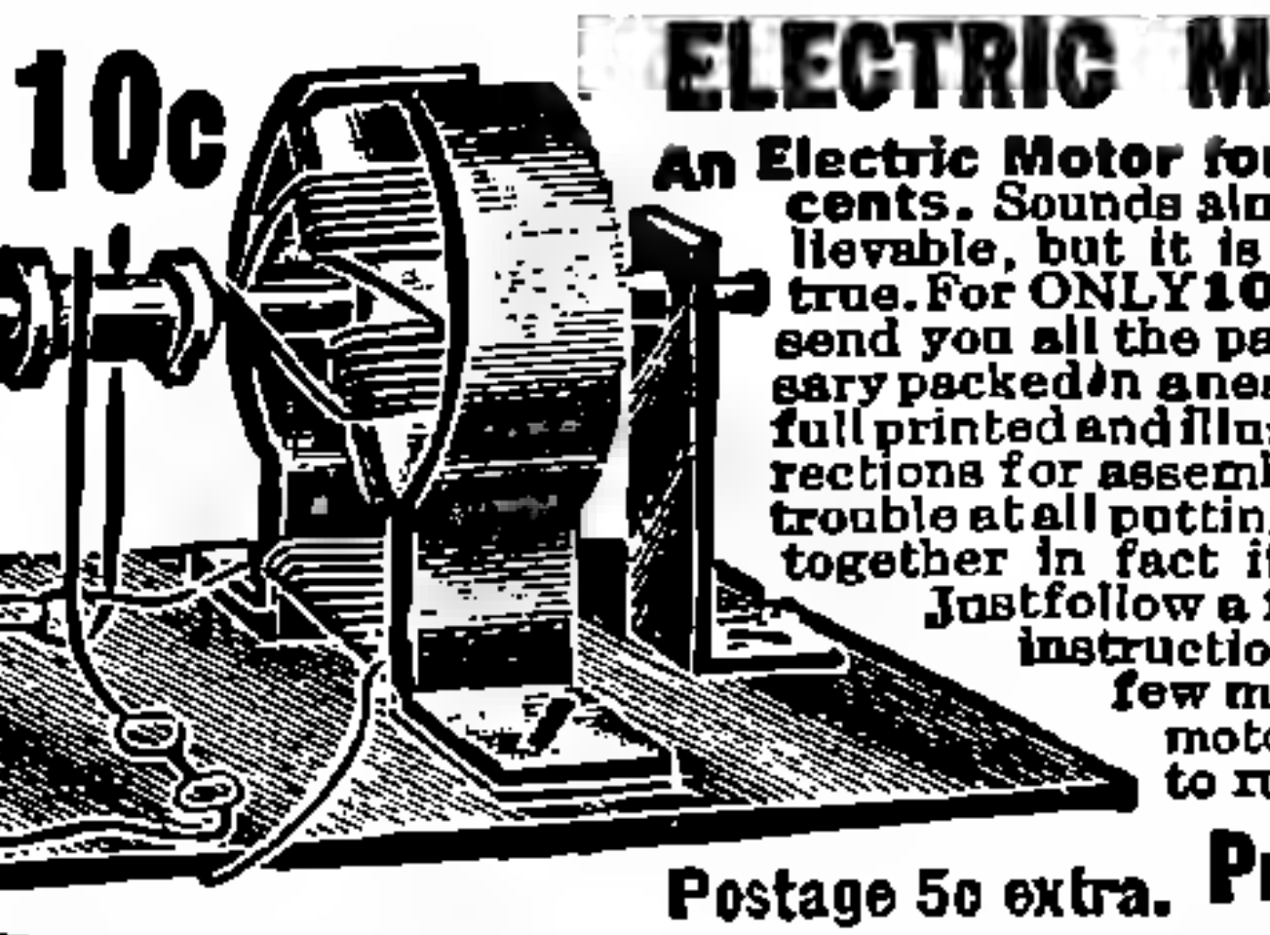

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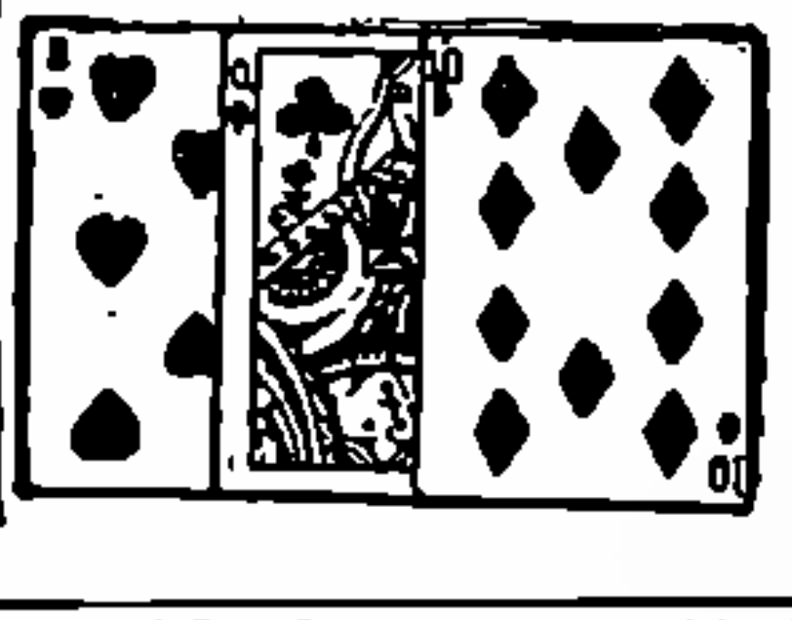

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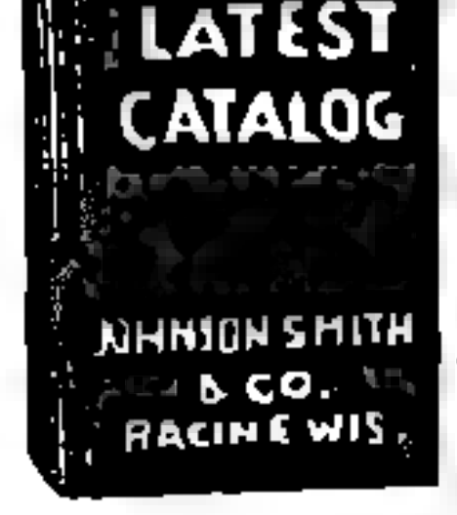
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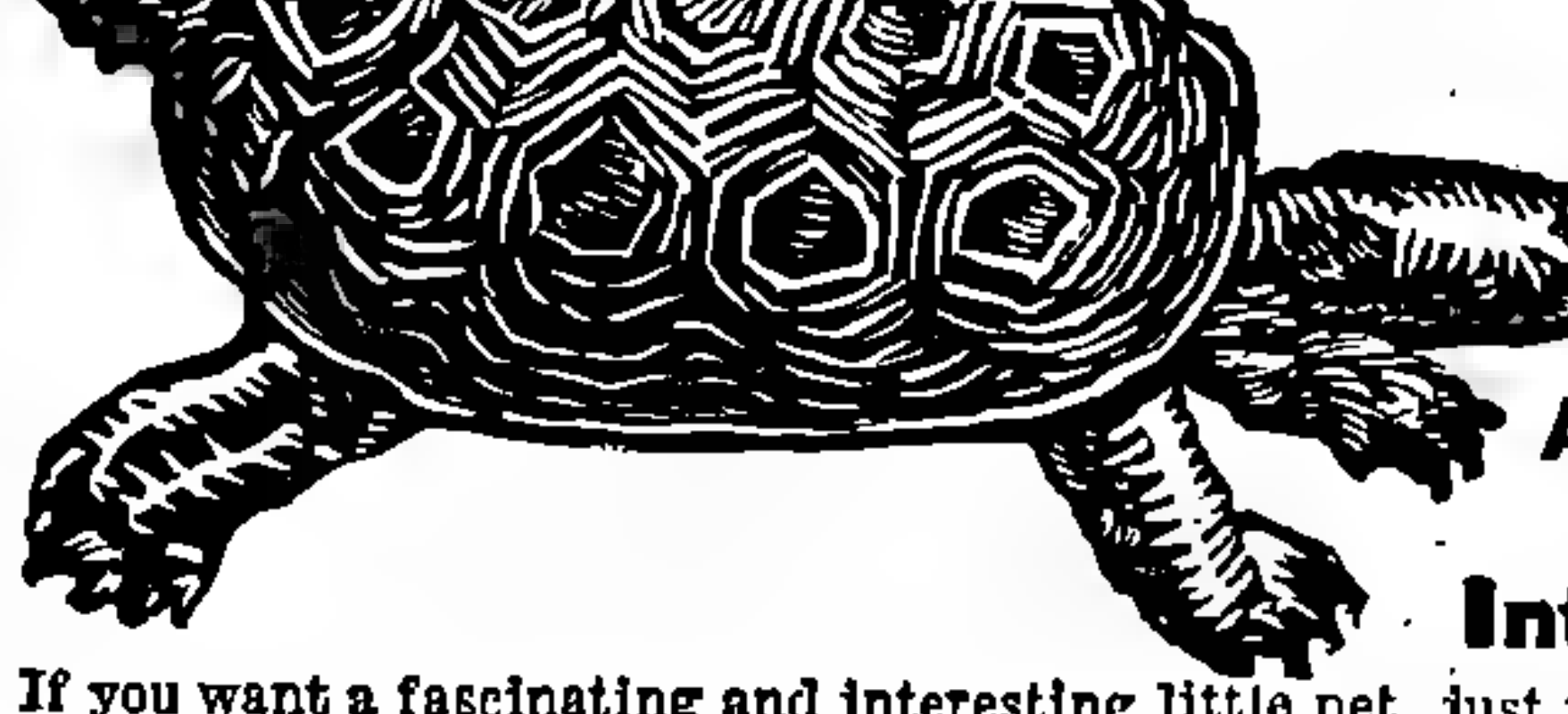

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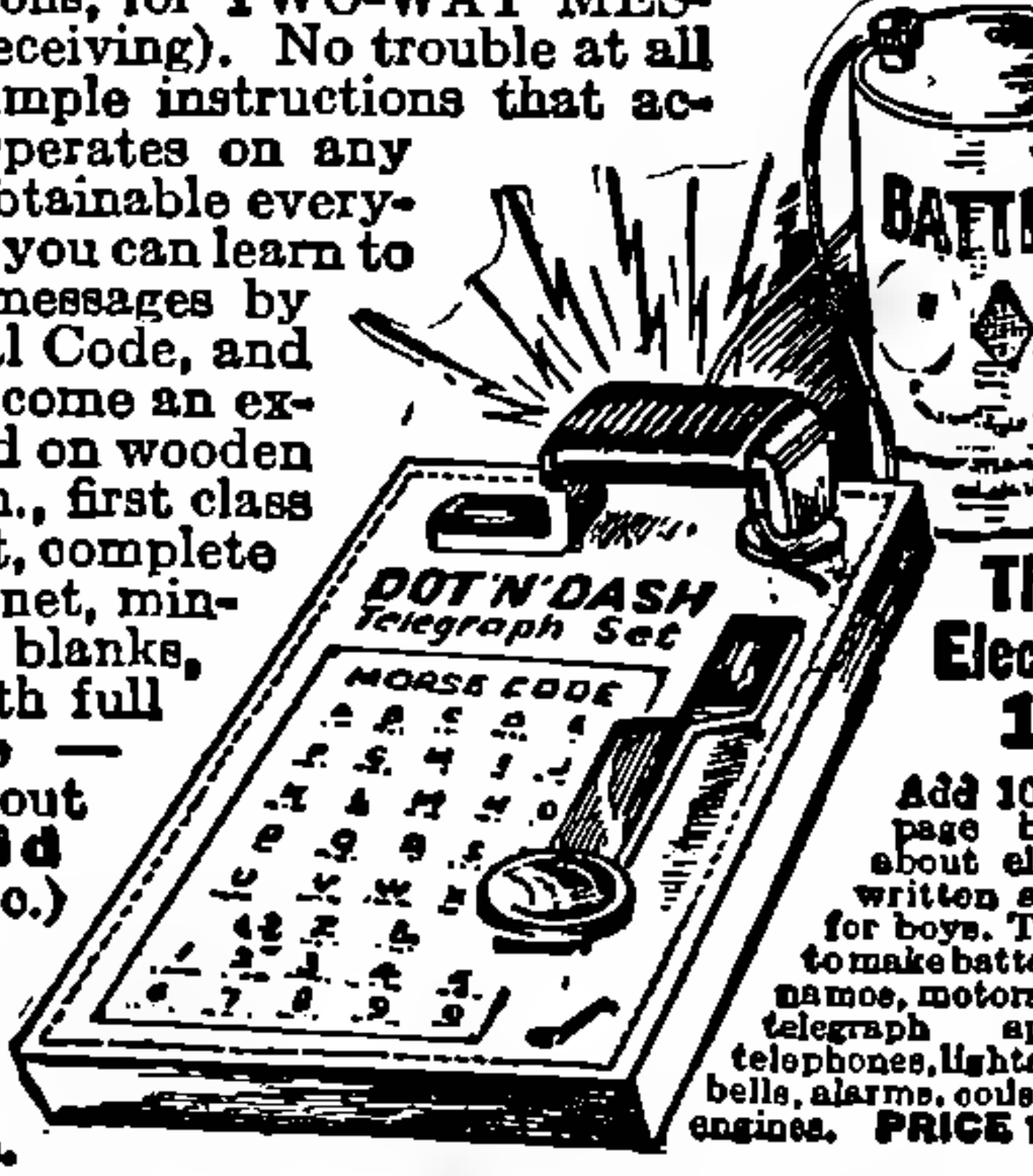
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Persons having neglected their Musical Education need not despair, for with the aid of our new VAMPING CARD (placing the card upright over the piano keys), you can Vamp away to thousands of Songs, Ballads, Waltzes, Rag Time, etc., etc. No knowledge of music is required. After using it a few times, you will be able to dispense with the aid of the Vamping Card entirely. The price of this very clever invention is only 15c postpaid.

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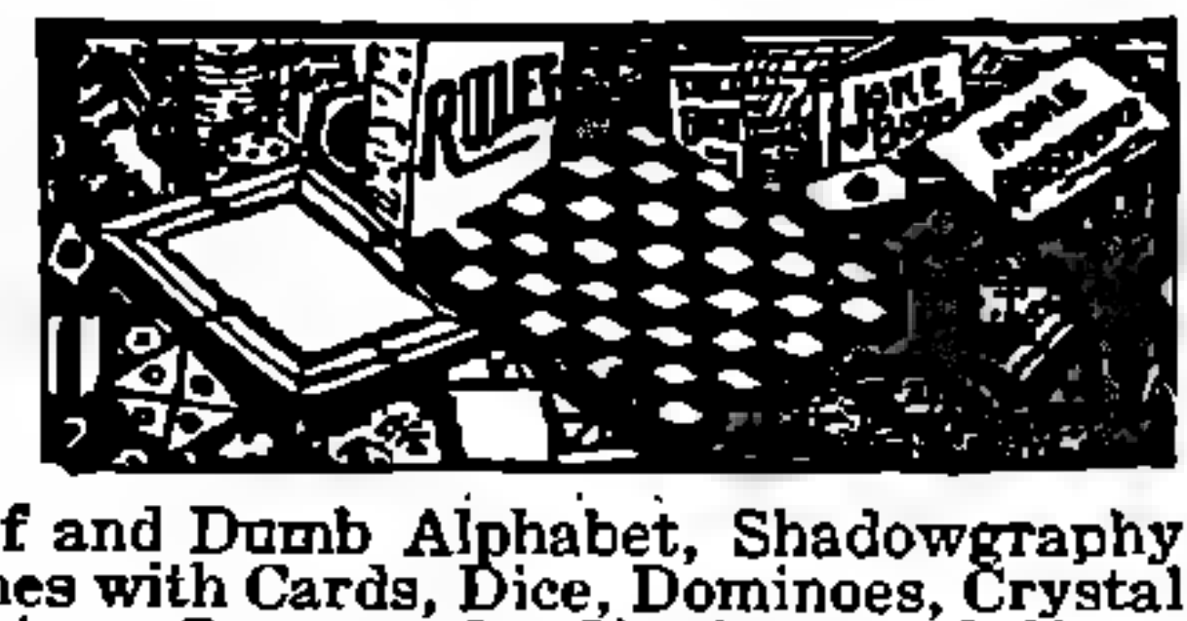

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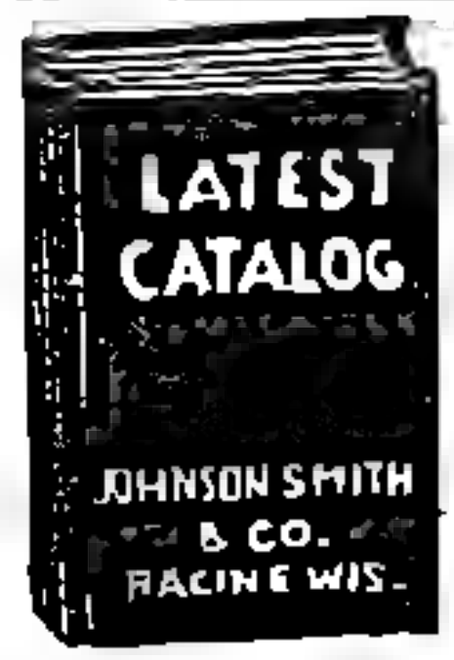
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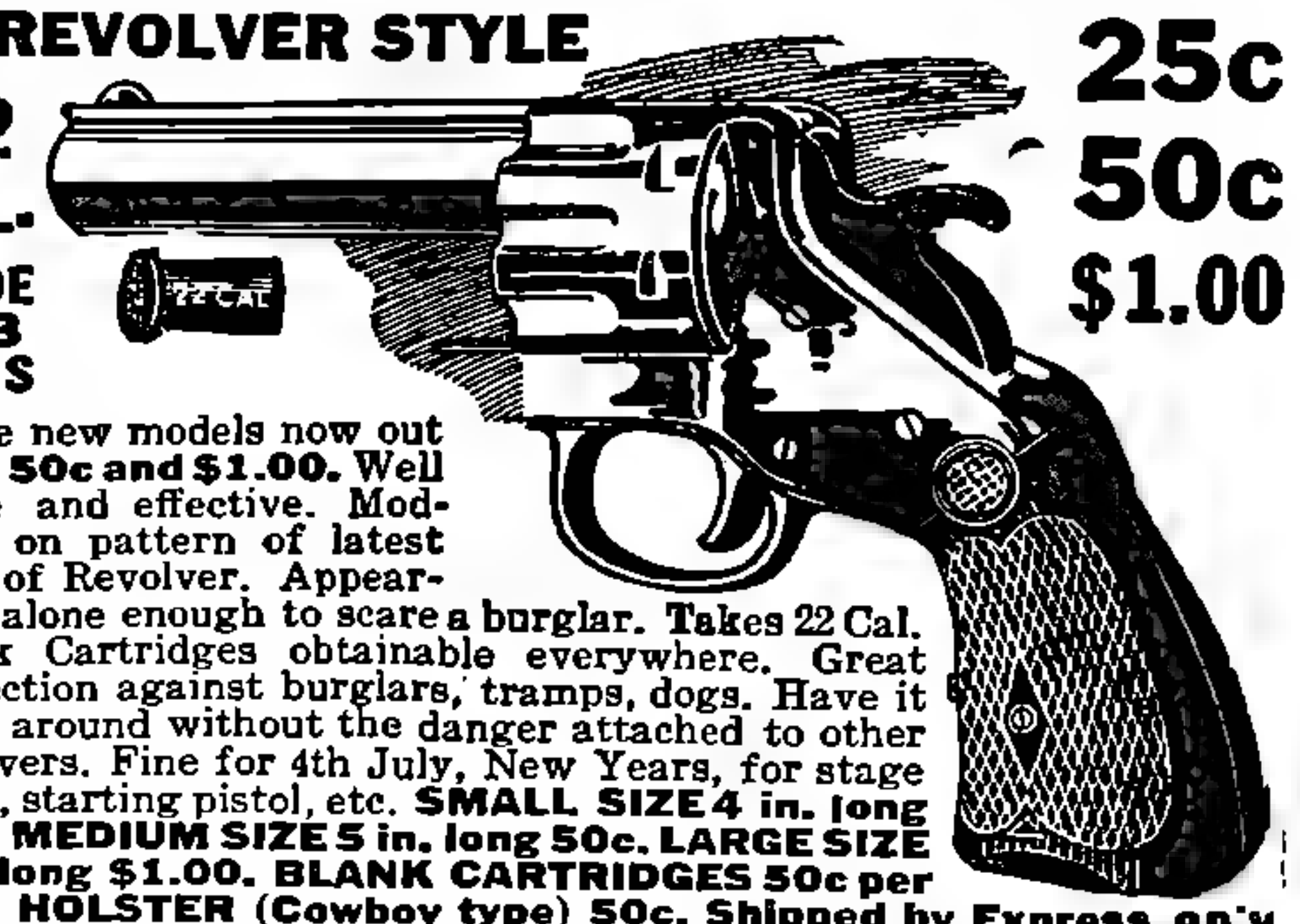

Three new models now out **25c, 50c and $1.00.** Well made and effective. Modelled on pattern of latest type of Revolver. Appearance alone enough to scare a burglar. Takes 22 Cal. Blank Cartridges obtainable everywhere. Great protection against burglars, tramps, dogs. Have it lying around without the danger attached to other revolvers. Fine for 4th July, New Years, for stage work, starting pistol, etc. **SMALL SIZE 4 in. long 25c. MEDIUM SIZE 5 in. long 50c. LARGE SIZE 6in. long $1.00. BLANK CARTRIDGES 50c per 100. HOLSTER (Cowboy type) 50c. Shipped by Express only not prepaid.** *710 page catalog of other pistols, sporting goods, etc. 10c*

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Here is a very great novelty in Rings, that is selling in thousands. It is a nicely made ring, finished in imitation platinum, and set with a large imitation diamond. It looks just like an ordinary ring, but in the shank of the ring is a small microscopic picture almost invisible to the naked eye, yet is magnified to an almost incredible degree and with astonishing clearness. There is quite an assortment of pictures that should suit all tastes. Some are pictures of bathing girl beauties, pretty French Actresses, etc., others are views of places of interest in France, Panama Canal and elsewhere; others show the Lord's Prayer in type, every word of which can be read by persons with normal eyesight. They are interesting without being in any way objectionable. **PRICE 25c, 3 for 65c, or $2.25 per doz. postpaid.** *710 page Catalog 10c.*

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LIVE DELIVERY GUARANTEED

Get one of these most wonderful of all creatures. Watch it change its color. Study its habits. Wear one on the lapel of your coat as a curiosity. Watch it shoot out its tongue as it catches flies and insects for food. No trouble to keep. Can go for months without food. Measures about 4 inches in length. Shipped to any address in U. S. A. by mail. We guarantee safe arrival and live delivery. **PRICE 25c, 3 for 50c, POSTPAID.**

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FUN, MAGIC AND MYSTERY

No 43
FUN MAGIC AND MYSTERY

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Exclusive! MY FLIGHT *into the* STRATOSPHERE

By Jean Piccard

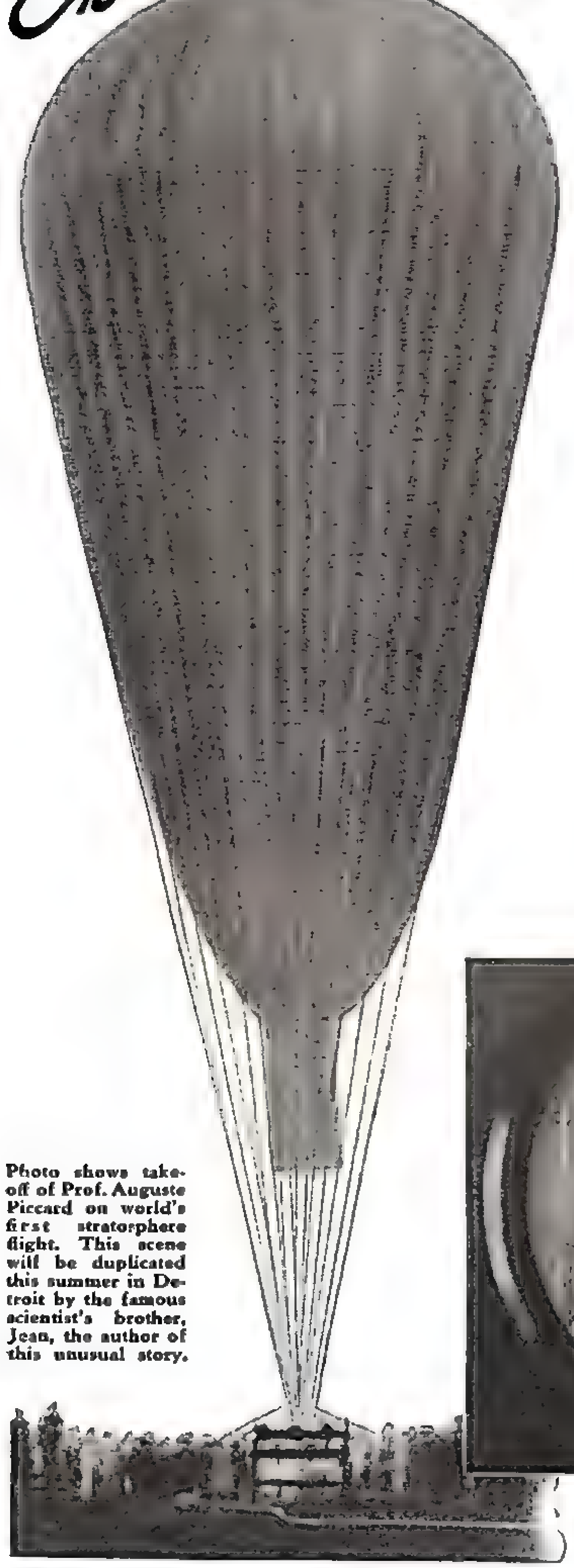


Photo shows take-off of Prof. Auguste Piccard on world's first stratosphere flight. This scene will be duplicated this summer in Detroit by the famous scientist's brother, Jean, the author of this unusual story.

EVER since the first stratosphere ascension of my brother, Auguste Piccard, I have been asked these questions:

"What about going still higher than the stratosphere? What about going beyond the earth's atmosphere? What do you think of week-end trips to Mars or a sight-seeing flight through the rings of Saturn?"

Eventually I believe it will be possible to circle the earth in two hours at an altitude where there is no air to interfere with one's motions. However, as to interplanetary travel—well, let us begin at the beginning:

It is strange to say, but half an hour from here there is something like an entirely new country. Stratosphere is the name given to it. It is the upper part of the earth's atmosphere, the region of eternal cold. It begins about six miles from the earth's surface, and the air of which it is composed is too rarefied to sustain human life.

So far, men have gone into the upper stratosphere only by means of balloons. No balloon, no matter how great its buoyant power, can go beyond the stratosphere, because a balloon is lifted by the surrounding air.

However, there is another method of locomotion which does not depend upon air—that is the rocket. The rocket supports itself by throwing off the products of combustion. A simple calculation shows that a rocket can easily contain enough energy to go beyond the stratosphere, say 100 or 1,000 miles from the surface of the earth. The calculation also shows that from a purely energetic point of view, a rocket might contain enough fuel to leave the neighborhood of the earth altogether, and visit our most distant sister-planets.

Such a flight to another planet would be theoretically possible but exceedingly difficult. And a return flight would probably be impossible. In the present state of our knowledge, it is useless even to discuss interplanetary travel as a practical thing. New sources of energy will first have to be tapped—sources related to the vast energy given off by radium and other radio-active substances.

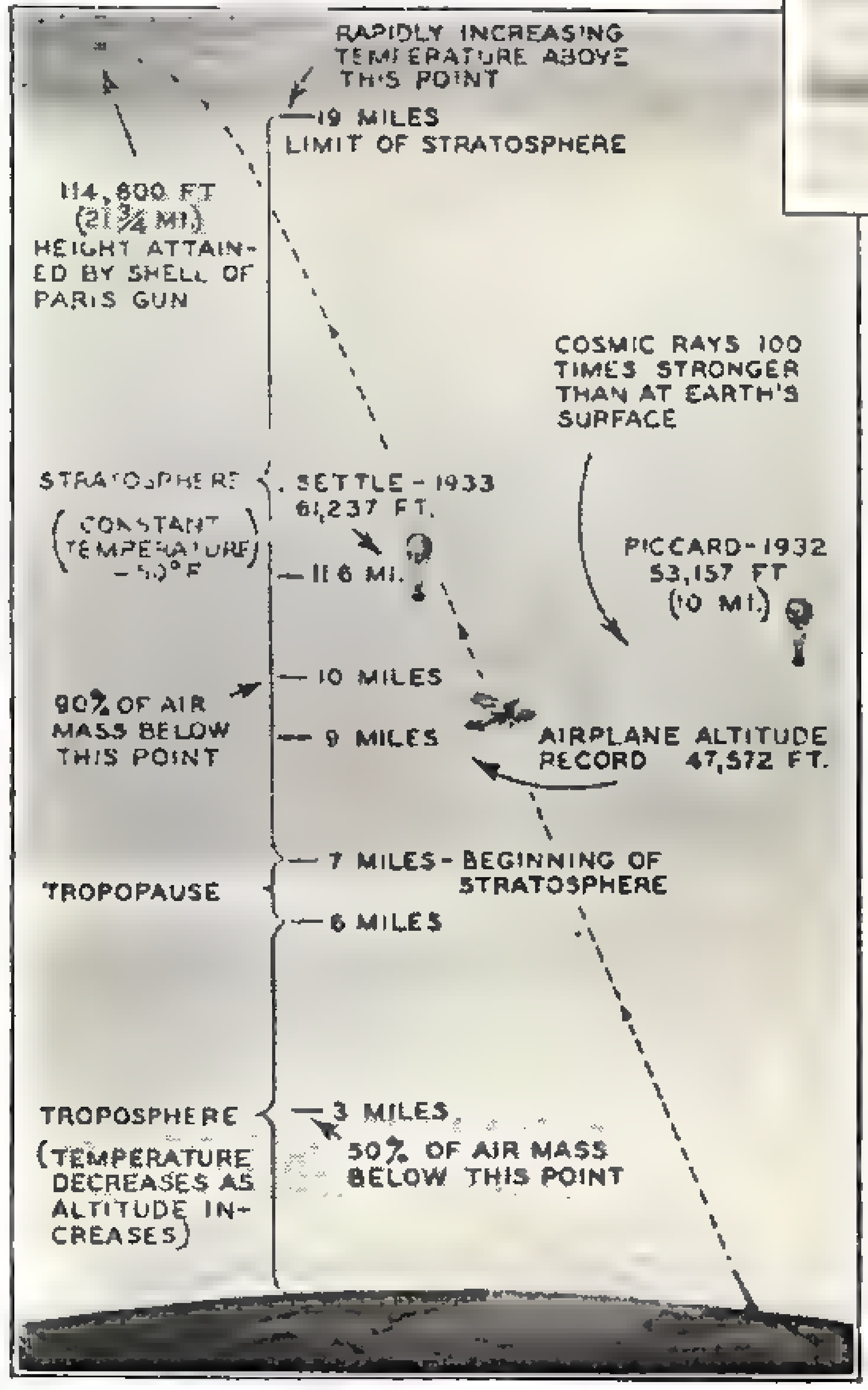
Physicists have just begun, less than a year ago, to create artificially, minute amounts of radio-active substances. If one could produce large amounts of these substances—say, put them on the market in lots of half an ounce—then it would be time to talk about interplanetary travel. It is

Prof. Auguste Piccard is shown with an assistant inside the aluminum gondola of the balloon which carried him to a height of more than ten miles into the stratosphere. Prof. Piccard was the first to invade the stratosphere.

Interplanetary Flight

BY BREAKING down matter, transforming it into light and utilizing the resultant energy, man may make a round trip to Mercury (57,000,000 miles distant) on about 110 pounds of lead, according to news interviews with Prof. Auguste Piccard.

Explosive fuels for interplanetary travel, however, offer difficulties. Moon-bound projectiles would require an initial velocity of 24,000 m.p.h., fired from a gun barrel almost 2,000 feet long. Moon rockets would need 20 tons of explosive. To avoid a smash on landing, another 20 tons is necessary to brake the rocket.


RAPIDLY INCREASING TEMPERATURE ABOVE THIS POINT
19 MILES
LIMIT OF STRATOSPHERE
114,800 FT (21¾ MI.) HEIGHT ATTAINED BY SHELL OF PARIS GUN
COSMIC RAYS 100 TIMES STRONGER THAN AT EARTH'S SURFACE
STRATOSPHERE (CONSTANT TEMPERATURE) −50°F
SETTLE-1933 61,237 FT.
11.6 MI.
PICCARD-1932 53,157 FT (10 MI.)
10 MILES
90% OF AIR MASS BELOW THIS POINT
9 MILES
AIRPLANE ALTITUDE RECORD 47,572 FT.
7 MILES-BEGINNING OF STRATOSPHERE
TROPOPAUSE
6 MILES
TROPOSPHERE (TEMPERATURE DECREASES AS ALTITUDE INCREASES)
3 MILES
50% OF AIR MASS BELOW THIS POINT

Man's conquest of space and the hardships he must endure are graphically shown in drawing above. Greatest height reached was that of projectile thrown by the Paris gun. Note how air mass grows less with the increase in height.

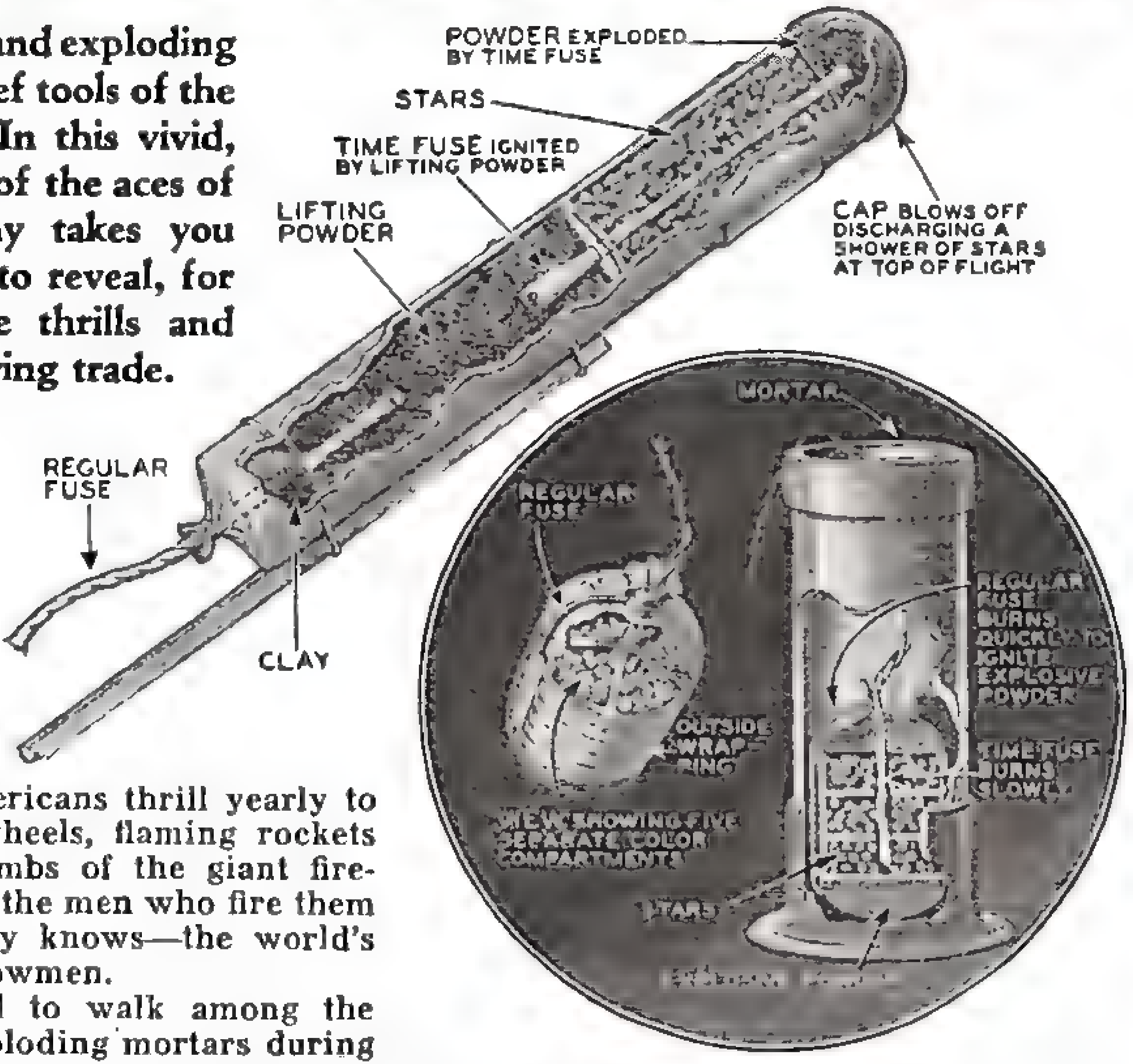
To be the first licensed woman balloonist and first of her sex to enter the stratosphere, Mrs. Jeannette Piccard, wife of the author, is taking balloon lessons, preparatory to piloting her husband into space. Above, left to right, Mrs. Piccard, Professor Piccard and the instructor, Edward J. Hill, noted Detroit balloonist, on a recent trial flight.

HOW A Fireworks Magician Tames Dynamite

Flaming dynamite and exploding mortars are the chief tools of the fireworks expert. In this vivid, intimate story one of the aces of the fireworks army takes you behind the scenes to reveal, for the first time, the thrills and dangers of his roaring trade.

by

PAUL PADDOCK


POWDER EXPLODED BY TIME FUSE
STARS
TIME FUSE IGNITED BY LIFTING POWDER
LIFTING POWDER
CAP BLOWS OFF DISCHARGING A SHOWER OF STARS AT TOP OF FLIGHT
REGULAR FUSE
CLAY
MORTAR
REGULAR FUSE
REGULAR FUSE BURNS QUICKLY TO IGNITE EXPLOSIVE POWDER
OUTSIDE WRAPPING
TIME FUSE BURNS SLOWLY
VIEW SHOWING FIVE SEPARATE COLOR COMPARTMENTS
STARS

Top drawing shows cross section of giant rocket that discharges star showers. Below is mortar and bomb which is divided into sections holding the different colored stars.

MILLIONS of Americans thrill yearly to the glittering wheels, flaming rockets and spectacular bombs of the giant fireworks displays; but the men who fire them are the men nobody knows—the world's most mysterious showmen.

How does it feel to walk among the flaming sets and exploding mortars during a big display? What are the real dangers of this roaring trade? What is the strange, unexplainable lure of a profession that requires toying with tons of explosives to give the crowds a flaming thrill?

Art Briese, for nineteen years an expert pyrotechnician for Thearle-Duffield, recently revealed the mysteries of his calling to an investigator for MODERN MECHANIX AND INVENTIONS. Briese has personally blown millions of dollars worth of fireworks into blazing ruins; he's touched off enough powder and dynamite to blow Pike's Peak into fragments; and he's come through his exacting job with injuries no more serious than scorched hands and a current enthusiasm for his work that's as keen as the day he got his first stick of dynamite to bore.

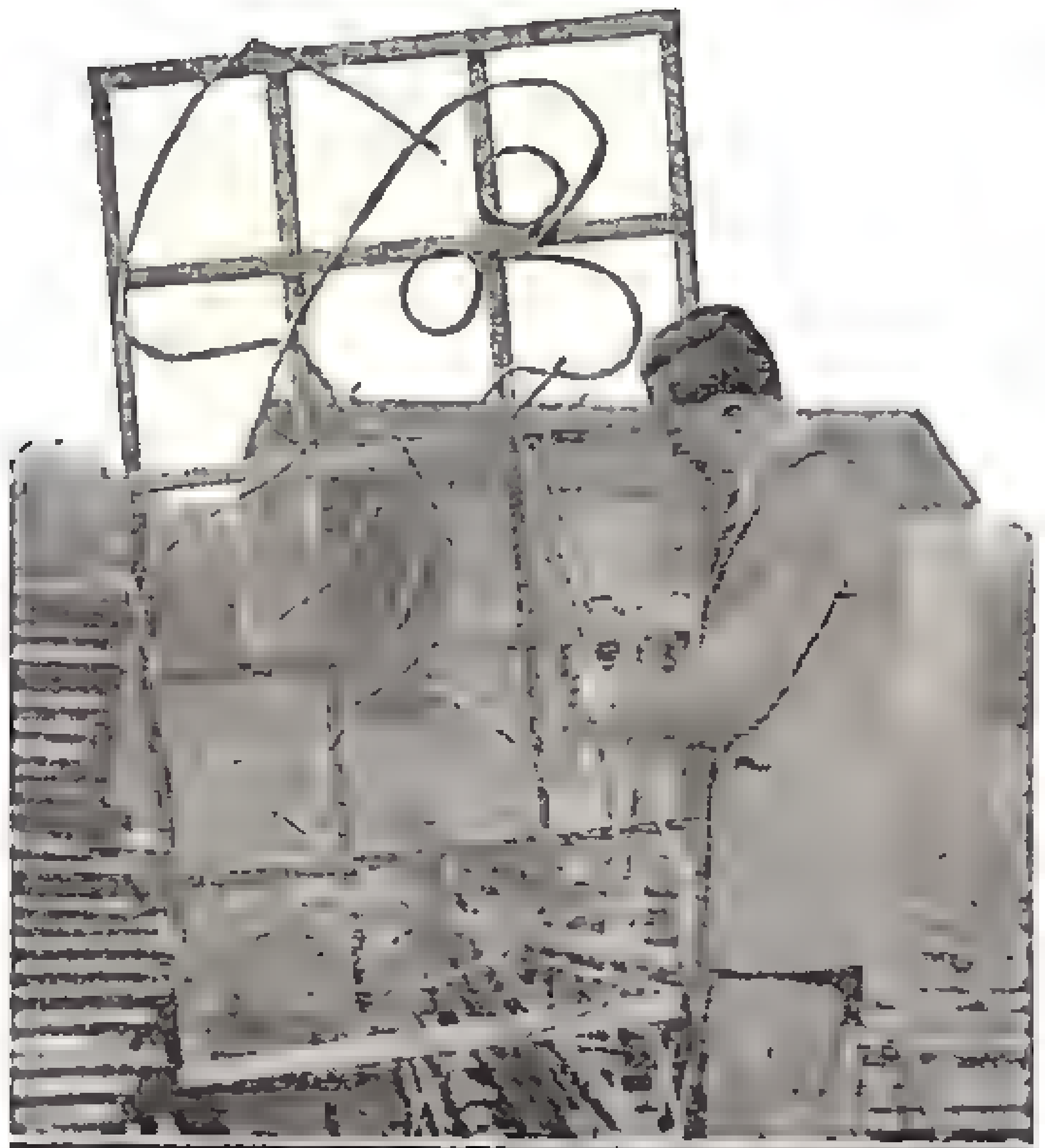
"One of the important things to keep in mind about fireworks," said Briese, "is the difference between display work and the over-the-counter business—that is, the sale of firecrackers, pin wheels, rockets and the like to the consumer. Accidents are far less frequent in display work because trained men do the firing.

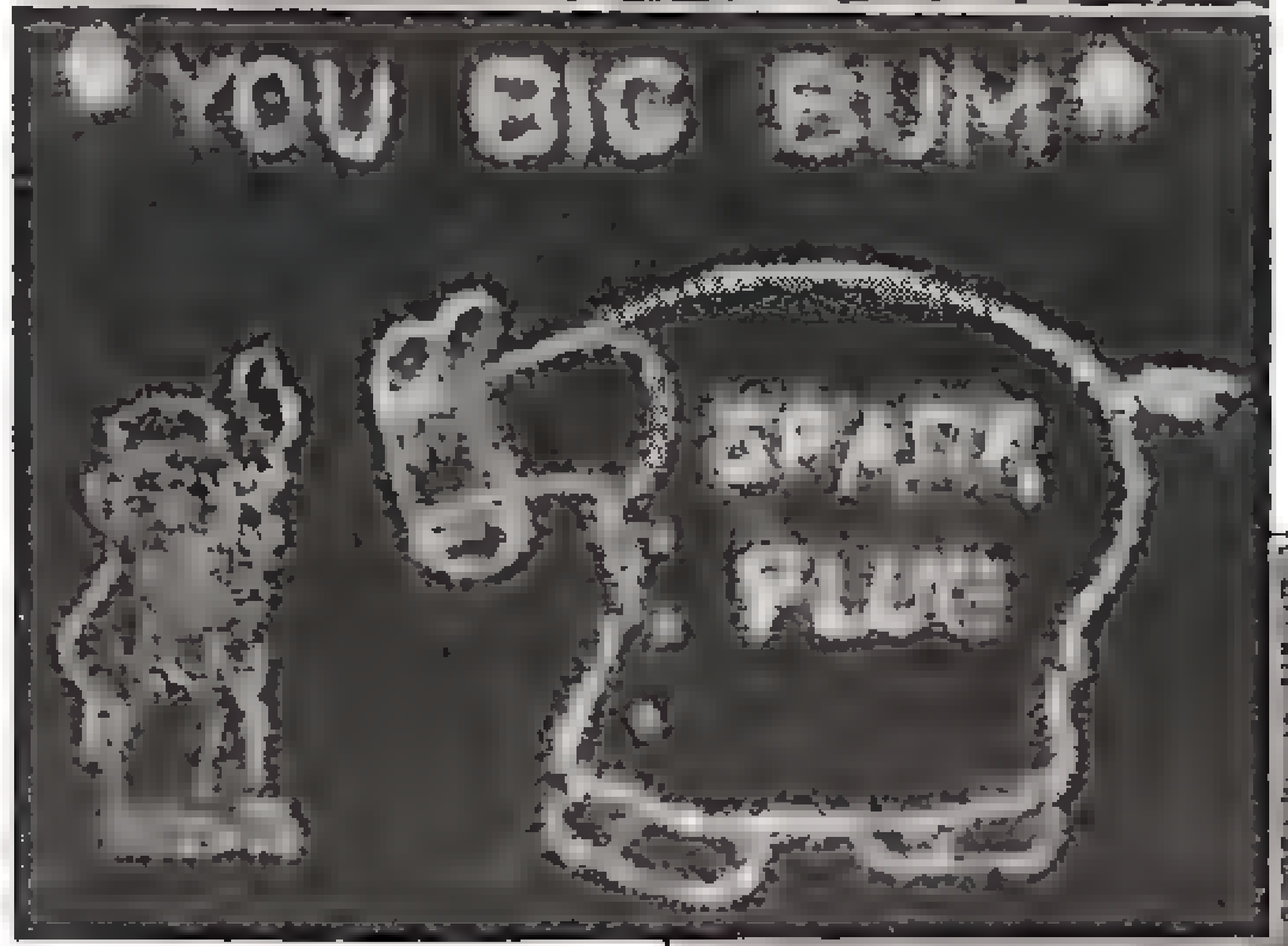
"The noise-makers are the most dangerous pieces. In fact, a stick of dynamite is about the most hazardous unit we employ. Of course, when this is handled properly, it's safe.

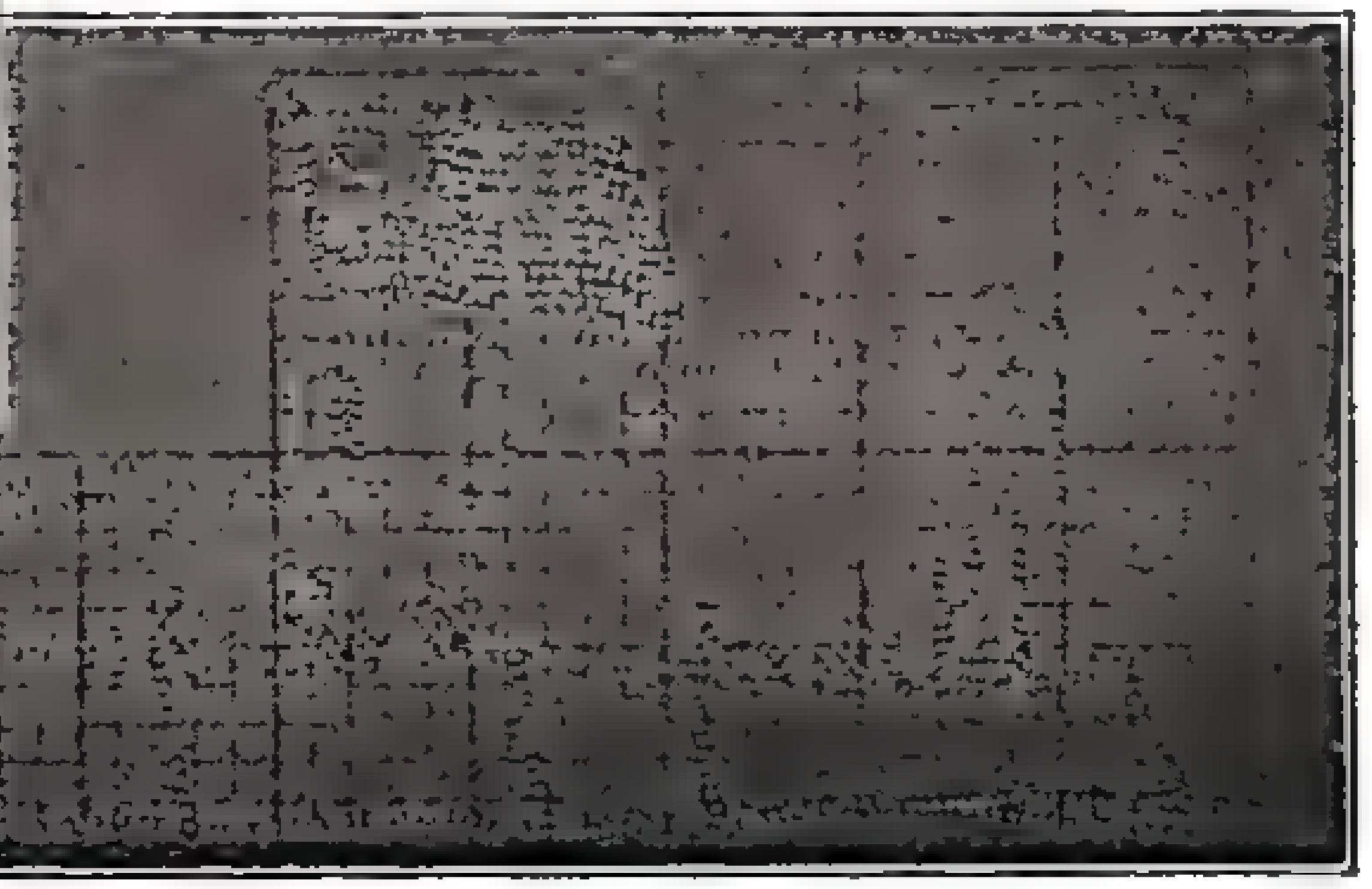
"We don't use much dynamite in the average show. At the Century of Progress, for instance, it is forbidden because the shock would be harmful to fish in the Shedd Aquarium. In shows where dynamite is used the sticks are fired electrically. They are suspended a few feet above the ground and carefully isolated to prevent damage. These shots and the big bombs we call 'ballyhoo.' The bombs are fired from mortars, steel cylinders buried up to their necks in the ground. Workers are protected by a barricade consisting of a 12" x 12" timber or a telephone pole to prevent danger in case a bomb is detonated in the mortar. The firing fuse lies out over the barricade where it can be ignited easily without getting too near the mortar. This fuse ignites a charge of powder at the base of the bomb, literally pushing it into the air. The explosion comes when a time fuse, already ignited, reaches the powder charge.

Guarding Against Accidents

"The worst accidents in the fireworks business occur at the factories but they are rare now. Only small quantities of material are handled at a time and most of the work is done in isolated sheds, spotted over a wide area. These sheds are of flimsy construction. If an explosion does occur, the







Top photo shows workman fashioning rattan outline of Barney Google for fireworks set piece above. At right is artist's drawing of Fort McHenry which workmen follow in placing rattan and fire lances on 5x10 foot frames covering 1000 square feet.

AMERICA'S NATIONAL CHAMPION REVEALS THE THRILLS AND SPILLS OF HILLCLIMBING

There are many fine tricks—from proper carburetor adjustment to selection of chains—that have enabled me to ride to several championships. In my shop at Glendale, California, I prepare my equipment for summer events, but only after many experiments do I decide on the exact equipment and method of riding to use on a particular hill. Unhappy and sometimes painful consequences result from using improper equipment.

If the motor does not loop when a rider pours on the power, it may jackknife, causing him to catch a heel in the chain. Only skill as the motor jumps over rocks and digs its way down into soft spots can keep the machine on the straightaway and out of the crowd.

Mechanical Aids to Victory

I do not count so much on my skill to bring me through to a victory as I do upon three mechanical factors: carburetor setting, proper gear ratio and chains on the rear wheel. In no form of racing does victory depend more on how we use our fuel and how the machine responds to the controls.

The slightest variation in the fuel supply makes a tremendous difference in the sensitive motor. If I want to hurdle a ditch, I pour it on and take all the speed and drive I can get; on the other hand, if the front wheel shows a tendency to leave the ground or if the chains are biting down into soft dirt, I retard the throttle a little.

The proper fuel combination is highly important. I have found a mixture of three-fourths alcohol and one-fourth benzol gives the greatest power and pick-up. The high speed carburetor adjustment is likewise important, requiring one full turn on the needle beyond the setting for gasoline to make the mixture rich enough. Alcohol-benzol is heavier than gas.

You can have a lot of sport riding your own motor up neighborhood hills, but if you want to get the best from your engine it will be a good idea to keep a record of all carburetor adjustments and the results in speed and power from each setting. From this you will learn how to handle your own motor. I always take this precaution.

Generally speaking, you should retard the spark and cut down on the high speed valve until the motor sneezes. Then come back on the valve until the motor will just take acceleration. With advanced spark the motor should be basically right, although you will need to make additional adjustments to suit conditions and your individual style of riding.

Do not underestimate the importance of chains. In my supply are two kinds. One is a Weed chain with loose overlapping links of the same type; the other is motorcycle chain with loose overlapping links of Weed. The first is best adapted to the soft or sandy hill and the latter seems best suited for a hard surface. More than once I have beaten a rival because he used the wrong type chain. Had my competitor done as I did—tried out both kinds on all types of hills—he might have fared better.

The Climb Begins!
He's off!

Hillclimbing Facts

Weight of motorcycle—316 lbs.
Piston displacement—45 cubic in.
Speed of the motor—6,000 r. p. m.
Crankcase lubrication—castor oil.
Fuel—alcohol, ¾; benzol, ¼.
Length of hills—100 to 600 feet.
Length of the take-off—25 feet.
Steepness of grades—50 to 80%.

Nearing the Top!

Taking off from a level start never more than 25 feet in length, hillclimbers must hurdle ditches, scale rocky ledges and keep their mounts level on an 80 per cent grade. Photos show how last-second disaster often cheats the rider.

In the west I use the motorcycle-Weed combination, generally speaking, while I usually equip with Weed only in the east.

The Muskegon, Michigan, hill illustrates the need for all-Weed. This is a rather sandy climb. In practice rides last year I found the sharp edges of the motorcycle chain dug a grave for the rear wheel and left me standing near the foot of the hill. When I changed to the other type, the loose links piled up on the tight links, giving me nearly an inch of projecting chain to better my traction which enabled me to climb easily to the top.

Selection of a proper gear ratio is one of the secrets of successful hill climbing. If you have too low a gear your motor may leap out from under you; if you have too high a gear your motor will stall. In the

(Continued on page 120)

Problems of STAGING a Championship Fight

by ALFRED ALBELLI

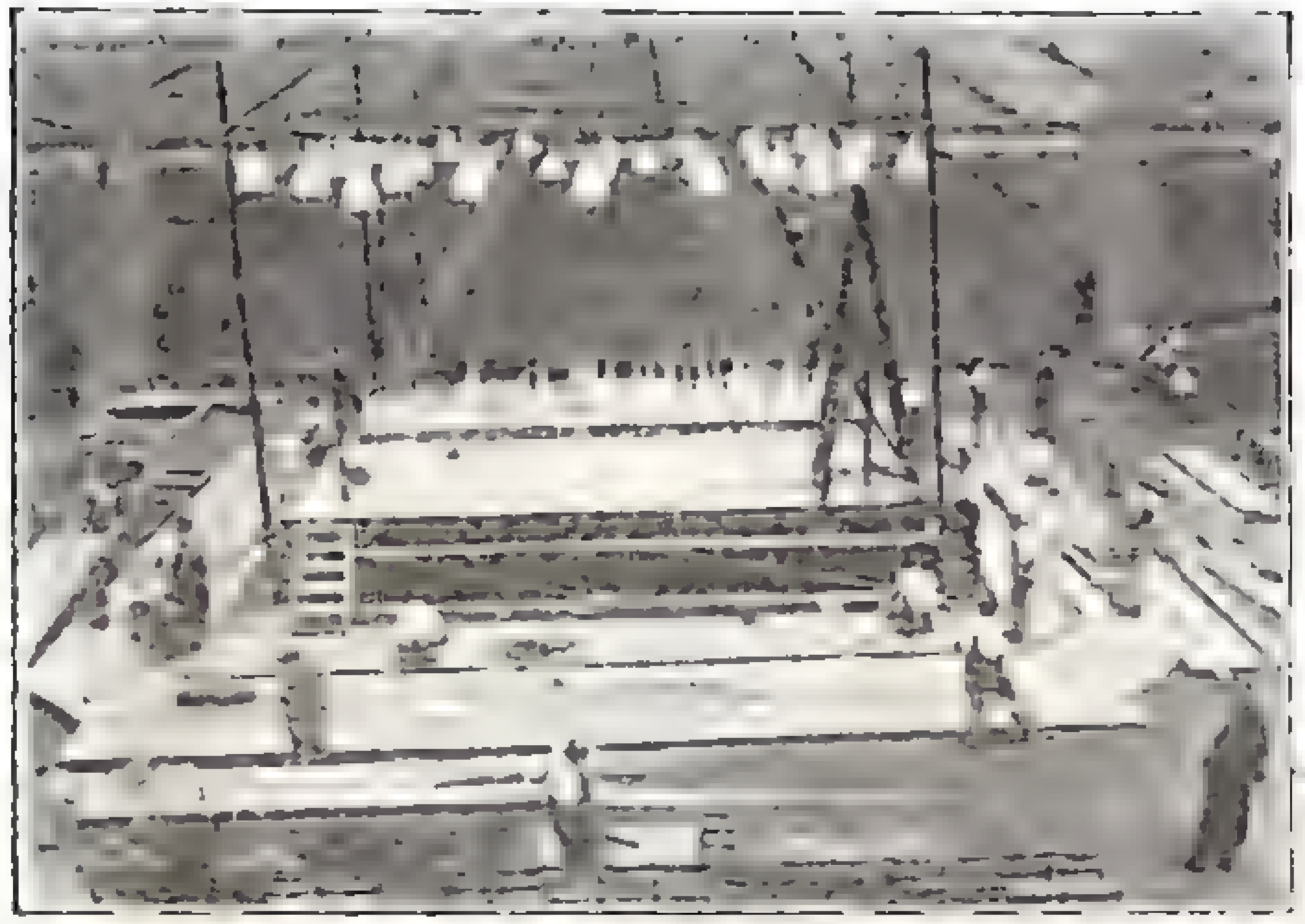
Putting on a big fight for throngs of 72,000 and the anxious outside world calls upon all the ingenuity of showmanship. How Madison Square Garden, of New York, does it is described here.

MADISON Square Garden's Long Island Bowl in New York, scene of the Primo Carnera-Max Baer heavyweight championship fight, is a triumph for the science of outdoor sport dramatics. Behind the scenes of this world's championship match are the latest mechanical marvels and an organization of showmanship, surpassing all previous open-air spectacles in the boxing business even in the days of the great Tex Rickard.

Engineering geniuses of the Madison Square Garden Corporation, headed by Lionel Levy, famous architect of the Long Island Bowl, made improvements in the bowl after a careful survey of conditions during the Jimmy McLarnin-Barney Ross welterweight championship fight in May.

The technicians regarded the prior show as "a dress rehearsal," and all details of lighting, seating, vision, and safety were checked over with penetrating caution, to insure the success of the heavyweight title fight.

The lighting effects are under the direction of Frank Niskern, an engineer formerly with the General Electric Company, but enticed into the outdoor entertainment business by Madison Square Garden. It was Niskern who improved lighting arrangements after ringside sports writers protested that the heat from scorching ring lights made their work unbearable.



At left is a closeup of the ring under construction. Forty-five 1,000-watt lights are hung in the framework to which is also attached batteries of megaphone loudspeakers.

Looking down from the bleachers to the ring the two elevated platforms for newspaper and newsreel cameramen are plainly visible. Because of the 1,000-watt lights sports writers seated at the ringside suffered from intense heat.

A staff of more than 1,500 is needed to control throngs of 60,000 to 72,000 persons attending the big fights. Here is an air view as crowds filled the Long Island Bowl for the Jimmy McLarnin-Barney Ross welterweight match.

Forty-five 1,000 watt electric lights were suspended 15 feet over the ring during the McLarnin-Ross fight. Before the heavyweight fight Architect Levy summoned photographers and newspaper reporters to the Madison Square Garden Bowl and they were directed to assume their places. The cameras were placed on stands 25 feet from the ring. These stands are steel towers, elevated above the ringside seats.

After considerable experimenting, Levy and the photographers agreed that a height of 22 feet was practical and saved the newspaper men from scorching heat.

The engineers then checked up on the loud-speaker system. Four highly sensitive microphones were suspended 15 feet over the center of the ring and connected to loudspeakers posted at the four corners of the framework holding the lights.

An electrical network in turn reproduced announcements by means of amplifiers scattered throughout the arena.

The outside world was not forgotten by the Madison Square Garden Corporation. Telegraph keys were posted beside each reporter's seat so that sportswriter and telegraph operator could work rapidly without interruption. Special telephones were installed, contacting the reporter at the ringside with his distant newspaper editorial room.

Problems that came up during the McLarnin-Ross fight were solved before Primo Carnera (left) and Max Baer met for their heavyweight championship battle in the big bowl.

Another innovation was the telephone system from the ringside to the dressing-rooms where opponents and their handlers were notified when their bout was to go on.

By a re-arrangement of the seating plan, so that only one inch was subtracted from the space between rows, Levy was successful in increasing the seating capacity from

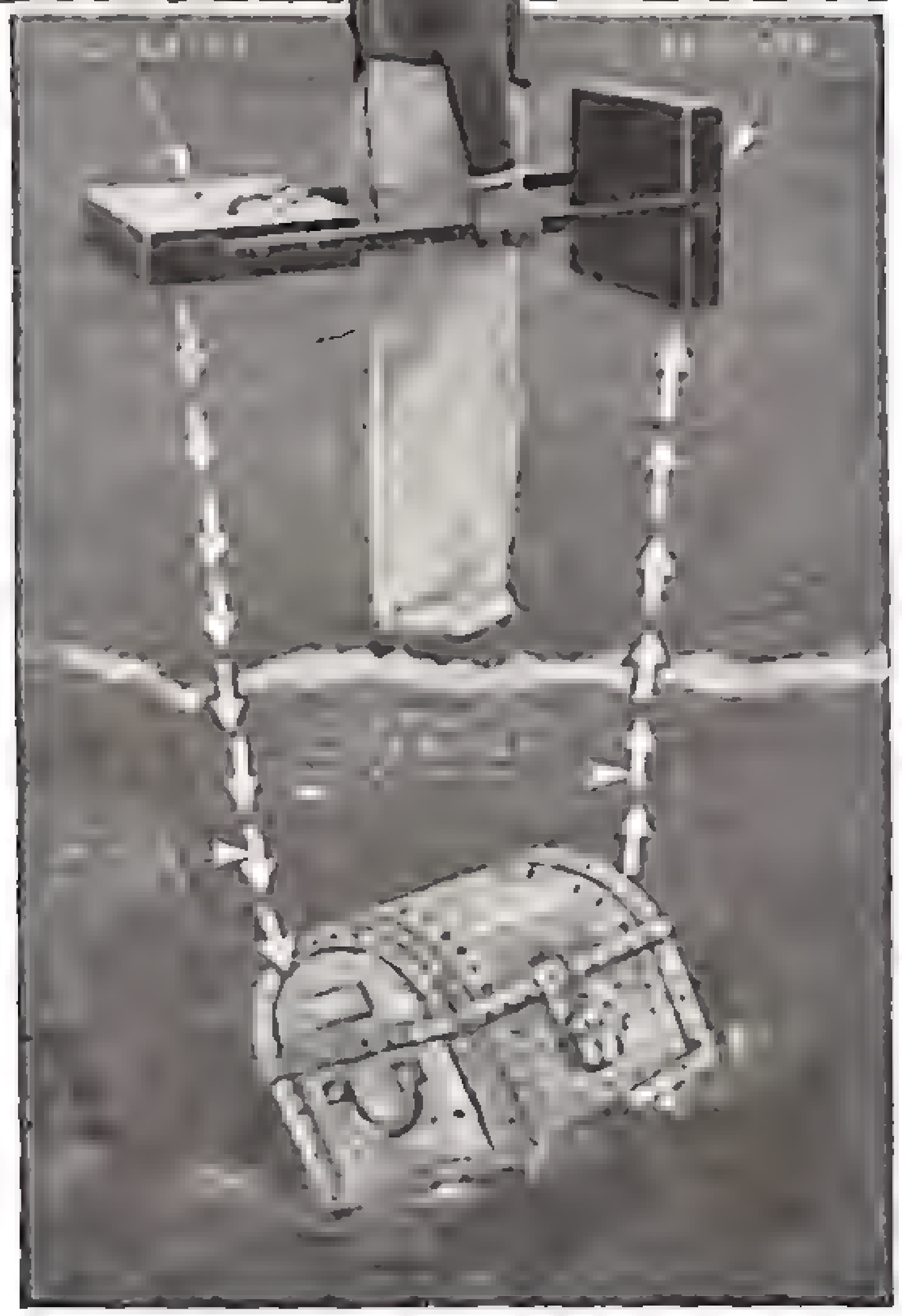
(Continued on page 121)

Radio HUNTERS SEEK PIRATE GOLD

by LEONARD WALTERS

Treasure Island!

Above—The beach at Cocos Island, goal of the treasure seekers, showing rude shack left by other expeditions. Right—A radio metal finder, similar in principle to that used by the English gold hunters. A change in the radio tone signal indicates the presence of buried metal.



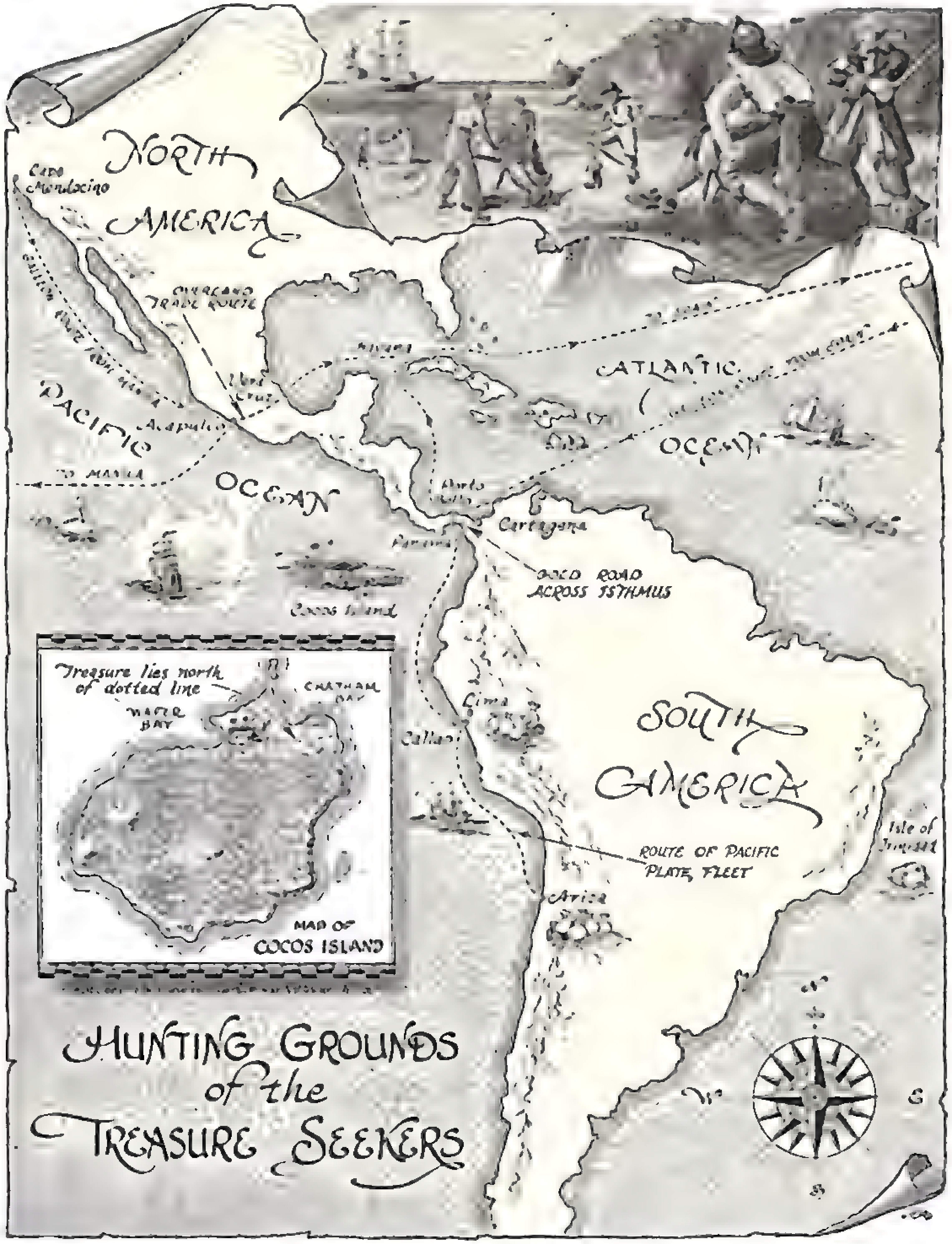
ANSWERING the challenge of ghostly buccaneers, an English expedition, armed to the teeth with modern scientific equipment, is preparing to lift the world's greatest treasure hoard—the pirate gold of Cocos Island.

Lying in the upper reaches of the South Pacific, about 500 miles south by west from Panama, Cocos Island has been the perennial goal of treasure seekers ever since the bloody days when pirates roved the tropic waters and hid their booty on the famous isle.

Hundreds of tons of gold and silver bullion lie buried in the jungle depths of Cocos Island—in fact, well founded estimates place the total value of the long-lost hoard as high as $60,000,000. This is the treasure which the English expedition hopes to find after countless others have failed.

Headed by Commander F. A. Worsley, Captain of Shackleton's *Endurance* in the Antarctic Expedition of 1914-16 and sailing master of Shackleton's *Quest* in 1921, the English group is basing their hopes of discovering the treasure upon the use of a new scientific machine embodying radio-electric principles. An electric field is set up on the surface of the earth by means of electrodes connected by wires to a portable battery case and a ratiometer mounted on a tripod. These electrodes are moved about to form a rectangular "grid." Any conductor of electricity lying underground—and gold and silver are among the best conductors known—will show a disturbance in the regularity of this grid easily detected through headphones worn by the operator. Once the presence of the precious

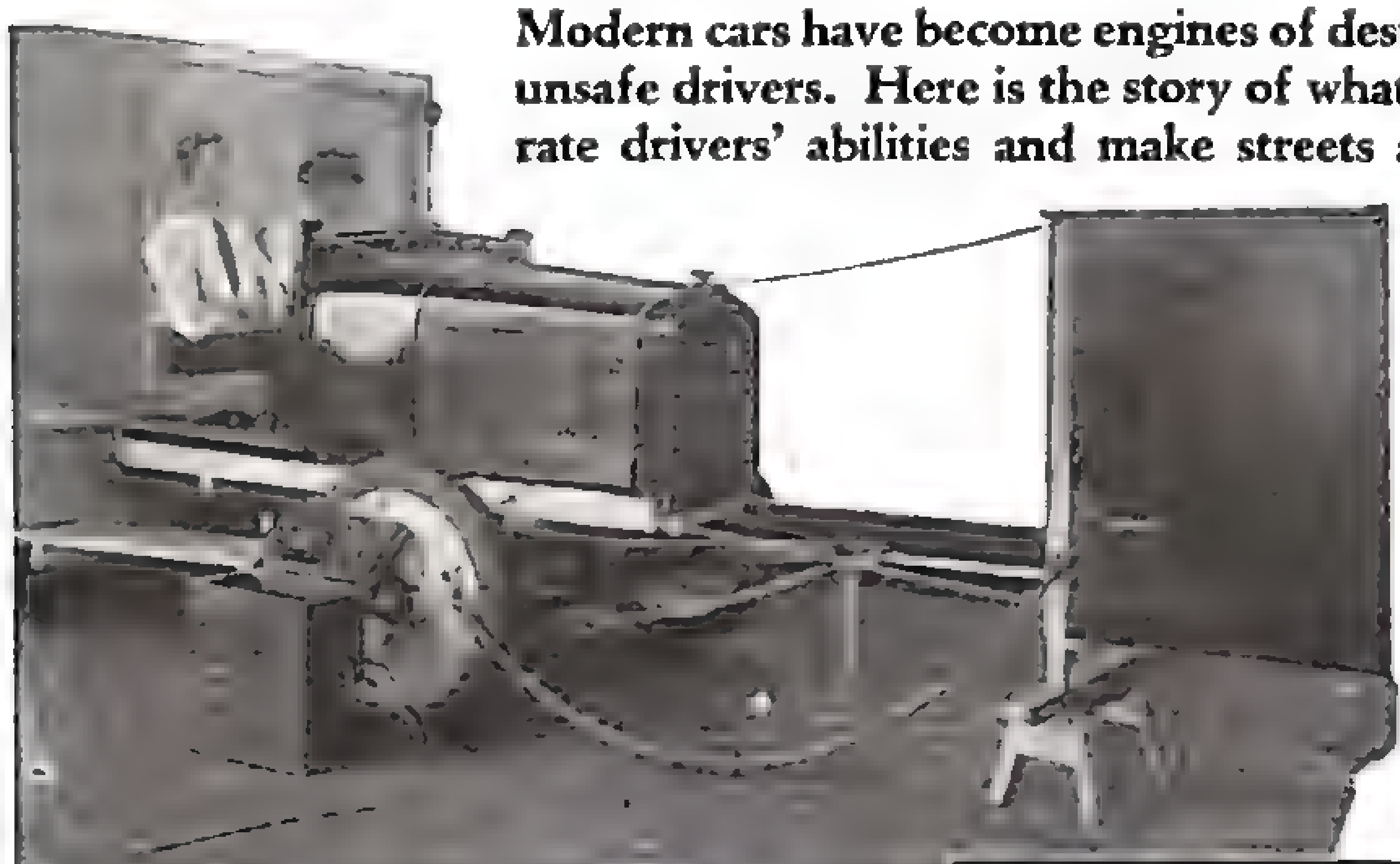
(Continued on page 134)

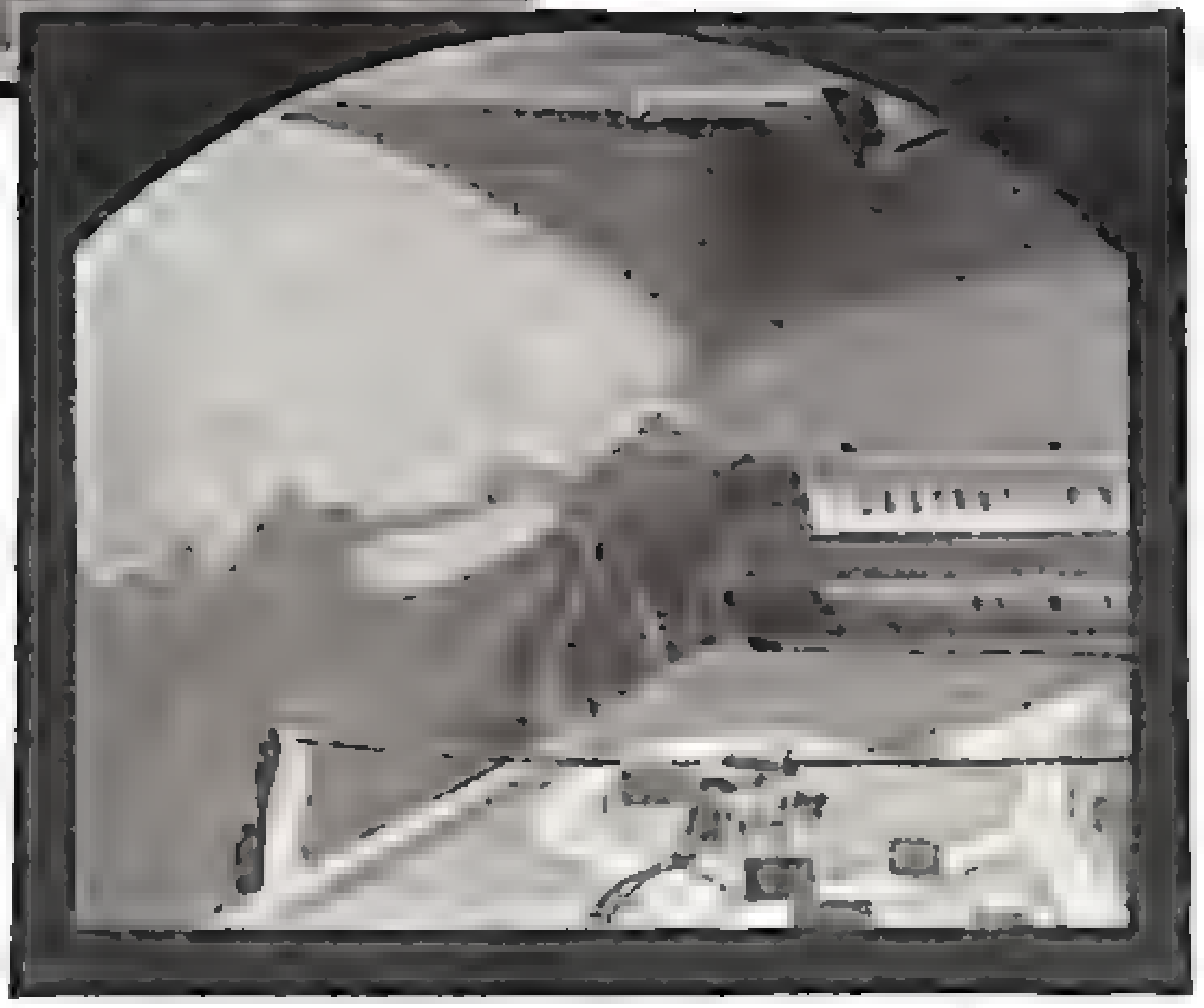

NORTH AMERICA
Cape Mendocino
OVERLAND TRADE ROUTE
Havana
Vera Cruz
Acapulco
PACIFIC OCEAN
TO MANILA
ATLANTIC OCEAN
TO SPAIN
Porto Bello
Cartagena
Panama
GOLD ROAD ACROSS ISTHMUS
Cocos Island
Treasure lies north of dotted line
CHATHAM BAY
WAFER BAY
MAP OF COCOS ISLAND
Callao
Lima
SOUTH AMERICA
ROUTE OF PACIFIC PLATE FLEET
Arica
Isle of Trinidad
HUNTING GROUNDS of the TREASURE SEEKERS

The graphic map above plainly shows why Cocos and its surrounding territory are such rich grounds for the treasure seekers. Spanish ships once sailed from Manila to Acapulco, Mexico, with cargoes valued at $10,000,000. Other galleons, laden with gold and silver, sailed from Arica and Callao to Panama, where shipments were transported across the Gold Road to Porto Bello. Some of these ships were driven on the reefs by storms where their cargoes were lost. Others fell into the hands of Drake, Morgan and Cavendish, who looted them and buried their treasure. Likewise, the Spanish ships plying the West Indies were waylaid by Captain Kidd, Lafitte and Blackbeard. Much of their plunder is reported still buried in Cuba, Haiti, Tortuga, Jamaica and St. Kitts. The isle of Trinidad presumably hides another pirate hoard.

ARE YOU FIT *to* DRIVE AN AUTOMOBILE

Modern cars have become engines of destruction in hands of unsafe drivers. Here is the story of what science is doing to rate drivers' abilities and make streets and highways safe.





Left—Seated at the wheel of a dummy automobile, a subject is taking an all-around driving test, as he faces the miniature stage shown below. Across the front of the stage, a toy car is suspended from an iron bar. The controls of the car in which the driver sits operate the toy car, moving it to left or right as the floor of the stage moves on an endless belt, to simulate passing road conditions. Driver's task is to guide the toy car as if in actual traffic.

by JOHN C. HARPER

THIRTY thousand people—one every fifteen minutes—were killed by automobiles in the United States last year.

During the same period 850,000 others were injured—an amazing average of one casualty every thirty seconds of the entire year.

In the hands of the unsafe driver, the modern automobile has become a terrible engine of potential destruction. Speeds of 80 and 90 miles an hour are virtually standard in all present cars; yet a speed only slightly higher—100 miles an hour—was condemned last year by the rules committee of the Indianapolis Speedway as having "gone beyond the physical limitations of the track for safe driving."

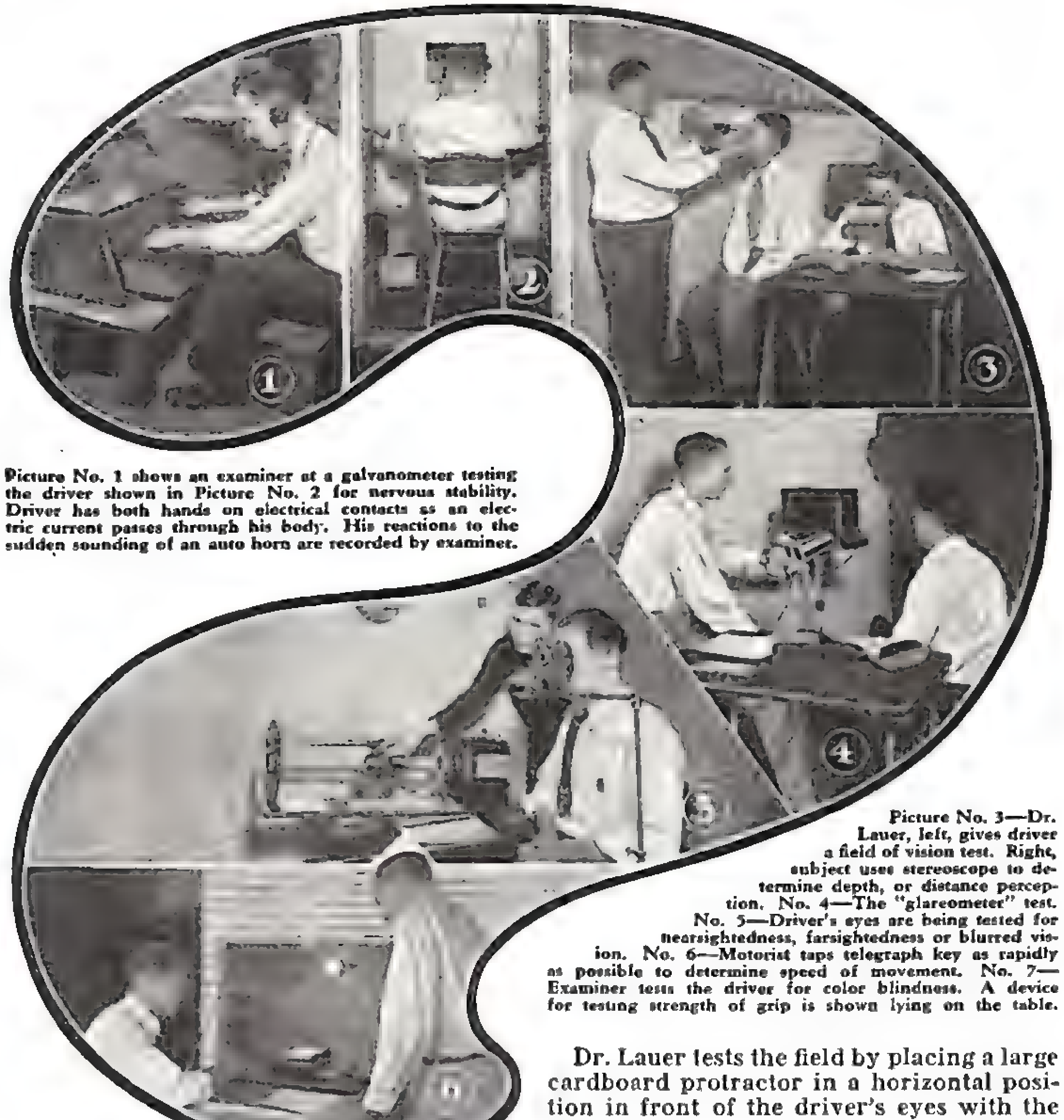
Unsafe Drivers Menace Public

Yet despite mounting casualty lists and high speed warnings men and women unfit to drive continue to roar down the highways headed for disaster. Some of these drivers cannot tell red from green; others see two cars where there is only one; still others become panicky and "freeze" when confronted with an emergency.

To halt this senseless slaughter and stem the casualty flood, Dr. Alvah R. Lauer, associate professor of psychology at Iowa State College, has recently perfected a series of tests which determine, with remarkable accuracy, the limits of a motorist's driving ability.

Dr. Lauer's experiments cover every possible contingency. His "driving dozen" tests the motorist's field of vision, depth perception, ocular dominance, glare resistance, color blindness, length of vision, strength of grip, speed of movement, reaction to noise, motor control, nervousness and general manipulation. In forty minutes he can find out as much about the subject's ability to operate an automobile safely as might be revealed in several years' actual driving.

There is the matter of field of vision, for example. A driver with normal sight may look through the windshield and yet, without changing the focus of his eyes, detect moving objects at either side. This gives him a total field of about 190 degrees, a margin of safety permitting him to watch crossroads and passing drivers. Other motorists, however, have an extremely narrow field, known as "tunnel vision." They see only as much as the normal person might if he were looking through a length of pipe.



Picture No. 1 shows an examiner at a galvanometer testing the driver shown in Picture No. 2 for nervous stability. Driver has both hands on electrical contacts as an electric current passes through his body. His reactions to the sudden sounding of an auto horn are recorded by examiner.

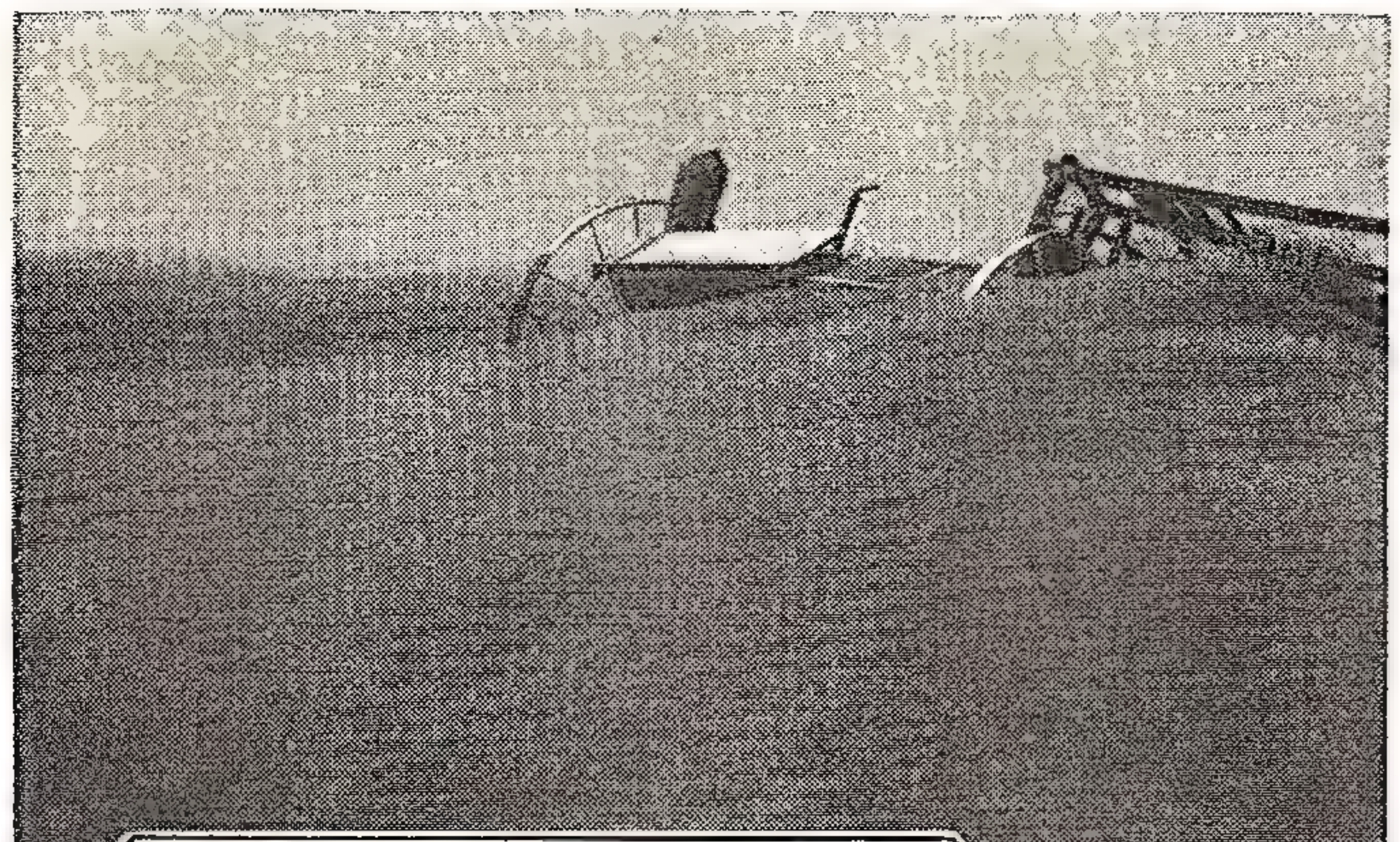
Picture No. 3—Dr. Lauer, left, gives driver a field of vision test. Right, subject uses stereoscope to determine depth, or distance perception. No. 4—The "glareometer" test. No. 5—Driver's eyes are being tested for nearsightedness, farsightedness or blurred vision. No. 6—Motorist taps telegraph key as rapidly as possible to determine speed of movement. No. 7—Examiner tests the driver for color blindness. A device for testing strength of grip is shown lying on the table.

Dr. Lauer tests the field by placing a large cardboard protractor in a horizontal position in front of the driver's eyes with the center of the flat edge at the bridge of the nose. While the driver's gaze is focused straight ahead, a pencil is moved along the curved edge of the protractor from front to back until it passes out of the driver's sight. The points of disappearance on either side give the measurement of the field.

The reader can test his own field of vision in a rough way by focusing his eyes on some object directly in front of him and wiggling his fingers at each side of his head. If he can see them when they are well to the side, he can be reasonably sure that his field is about normal. Dr. Lauer's tests have shown

(Continued on page 121)

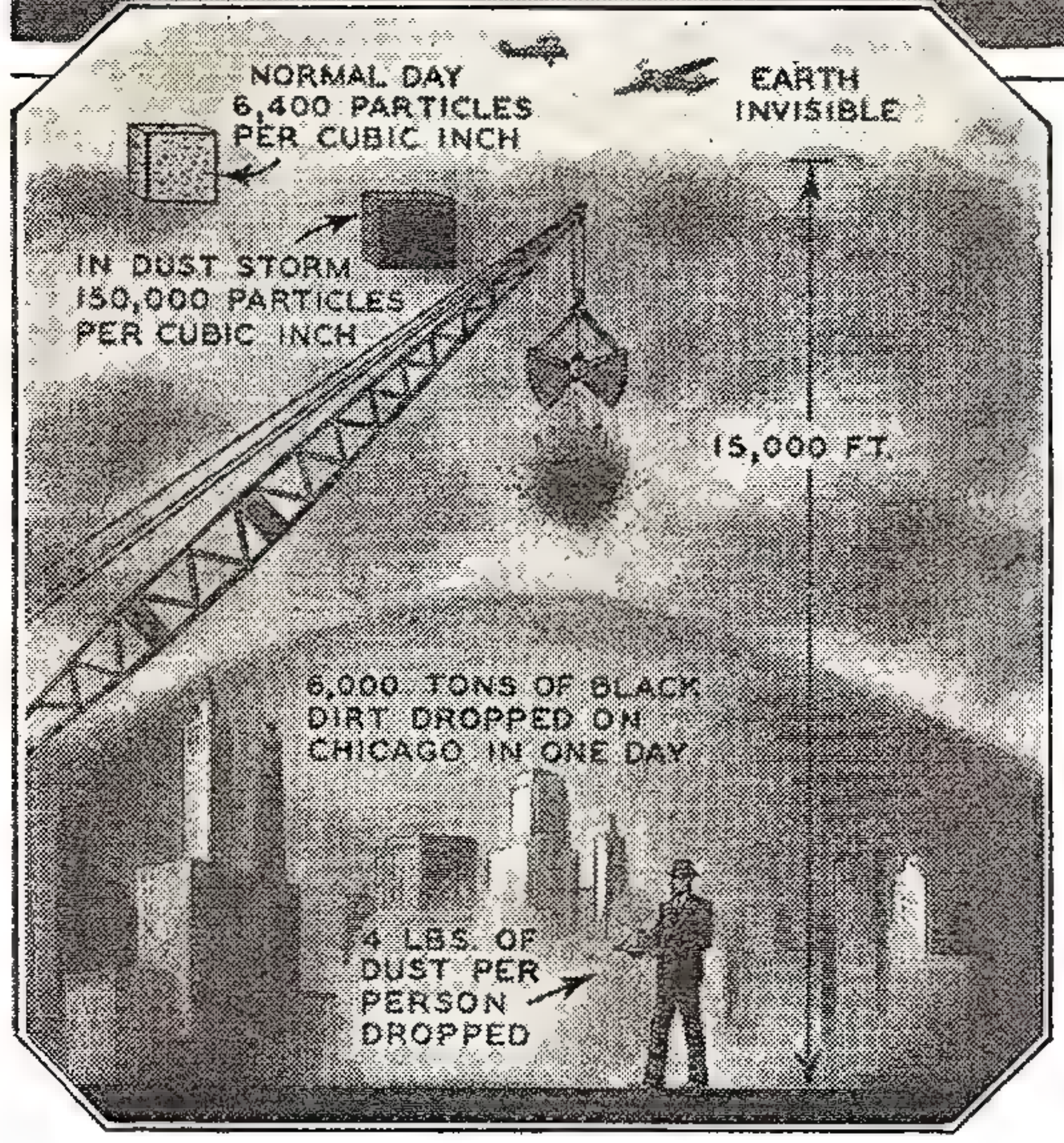
Will "*Black* BLIZZARDS" MAKE U. S. *a* DESERT?



Dust storms carried away 300,000,000 tons of soil from fertile farms of the Middle West. Drifting sands that remain threaten to destroy this region. Here is a startling story about a storm that cost $2,000,000 a day.

At left can be seen a huge drift of dust that almost covered farm machinery. In some cases the dust drifts were 20 ft. deep.

by
James Nevin Miller


NORMAL DAY
6,400 PARTICLES PER CUBIC INCH
EARTH INVISIBLE
IN DUST STORM
150,000 PARTICLES PER CUBIC INCH
15,000 FT.
6,000 TONS OF BLACK DIRT DROPPED ON CHICAGO IN ONE DAY
4 LBS. OF DUST PER PERSON DROPPED

Above are some unusual statistics gathered during the dust storm by the weather bureau. The dust was so thick it drifted into homes through closed windows and in some cases forced cancellation of schedules of transport airliners.

GIGANTIC dust storms sweeping across the United States like "black blizzards" threaten to convert the fertile Middle West into a desert as arid as the Sahara.

In a few days 300,000,000 tons of dust, once fertile soil in regions west of the Mississippi, were whipped into the air by strong gales. The vast cloud, so black and somber that the sun was hidden, had a front 900 miles wide. It originated in the sandy country of Montana, and picked up more soil as it swept over the Dakotas, Minnesota and other midwestern states.

The "black blizzard," two miles high, continued on across the United States dropping its load gradually as it moved out over the Atlantic.

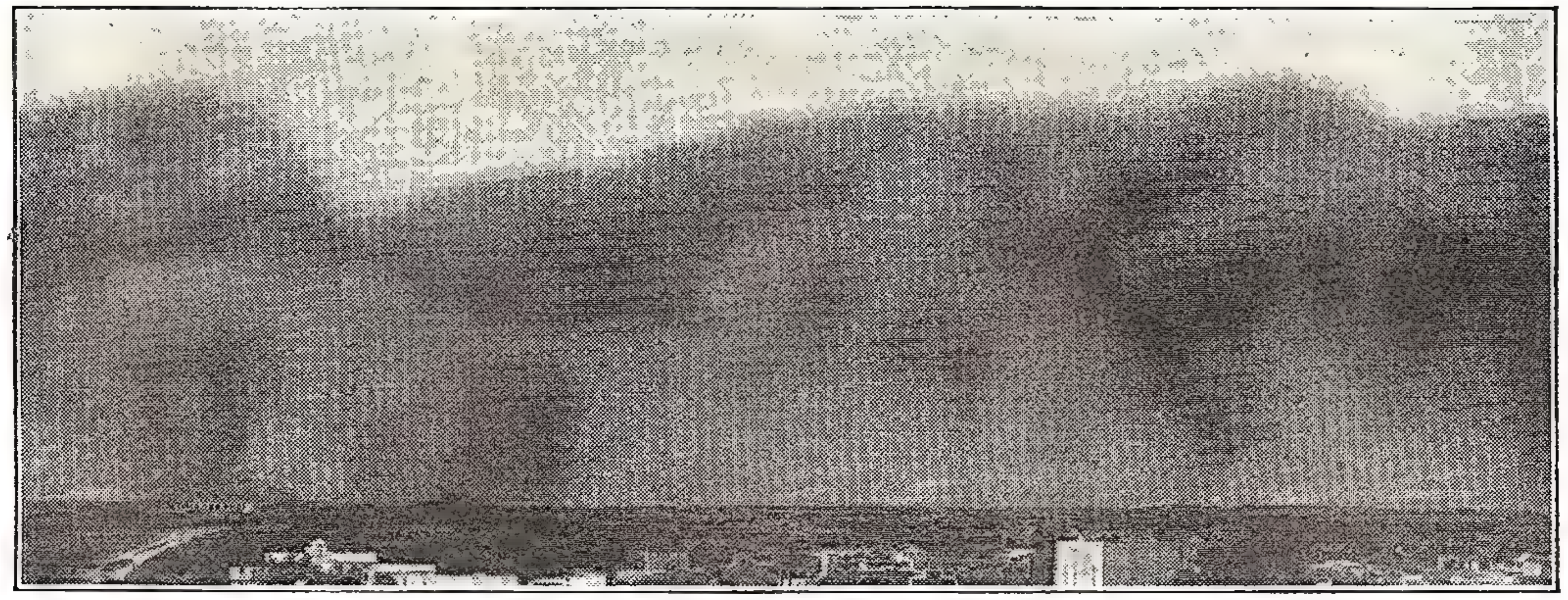
The storm was a devastating climax to a 28 day drought. Wheat farmers in the fertile Great Plains areas lost an estimated $2,000,000 a day as vegetation burned. Countless cattle in parched fields sickened and died as dust blanketed pastures. Innumerable young plants, notably wheat and corn, were literally blown from their base, causing severe crop damage.

The storm, Dr. W. J. Humphreys, of the Washington Weather Bureau, said, originated in the bare land of the Great Plains states that had been pulverized by cultivation and dried by severe drought. Violent gales swept this powdery soil up in a huge cloud.

Experts point out that man's attempts to cultivate dry lands in the far west threaten to convert the states west of the Mississippi into a vast desert. Formerly the loose soil and sand was held in place by wild grasses. Plowing under of this grass exposed the light earth to the constant winds.

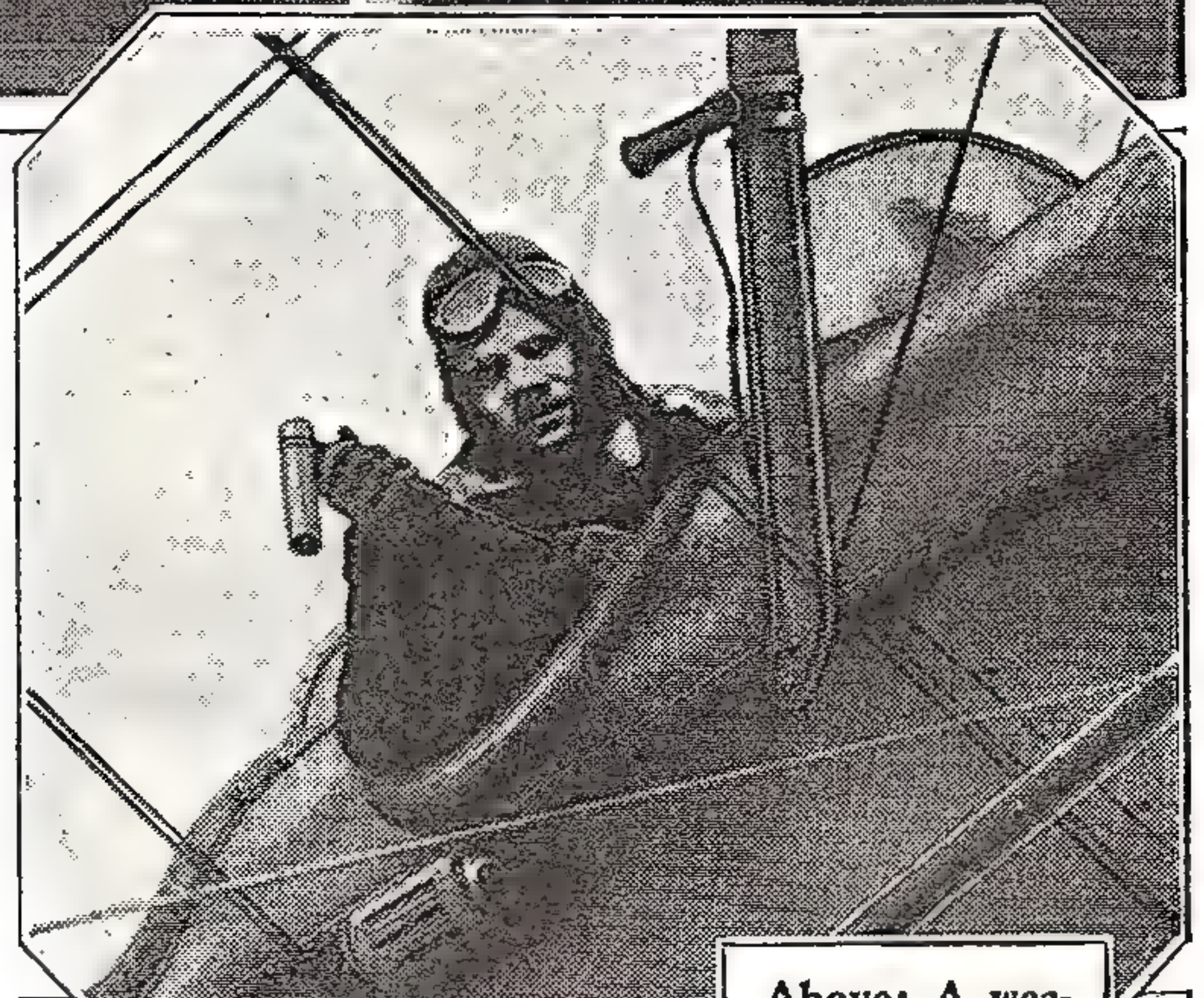
The erosion is becoming so severe it is feared that within a few years the poor soil that remains will not support any type of vegetation. Investigation shows that the wind carries away the light, fertile soil, leaving the coarser sand to drift across the land. This sandy soil will not hold water and unless steps are taken there is danger that the vast region will become a desert.

Recent discoveries indicate that the Sahara was once a fertile country. Whether it was doomed to be an arid desert by dust storms is not definitely known, but records show that Europe has been swept for centuries by "black blizzards" originating in the Sahara.

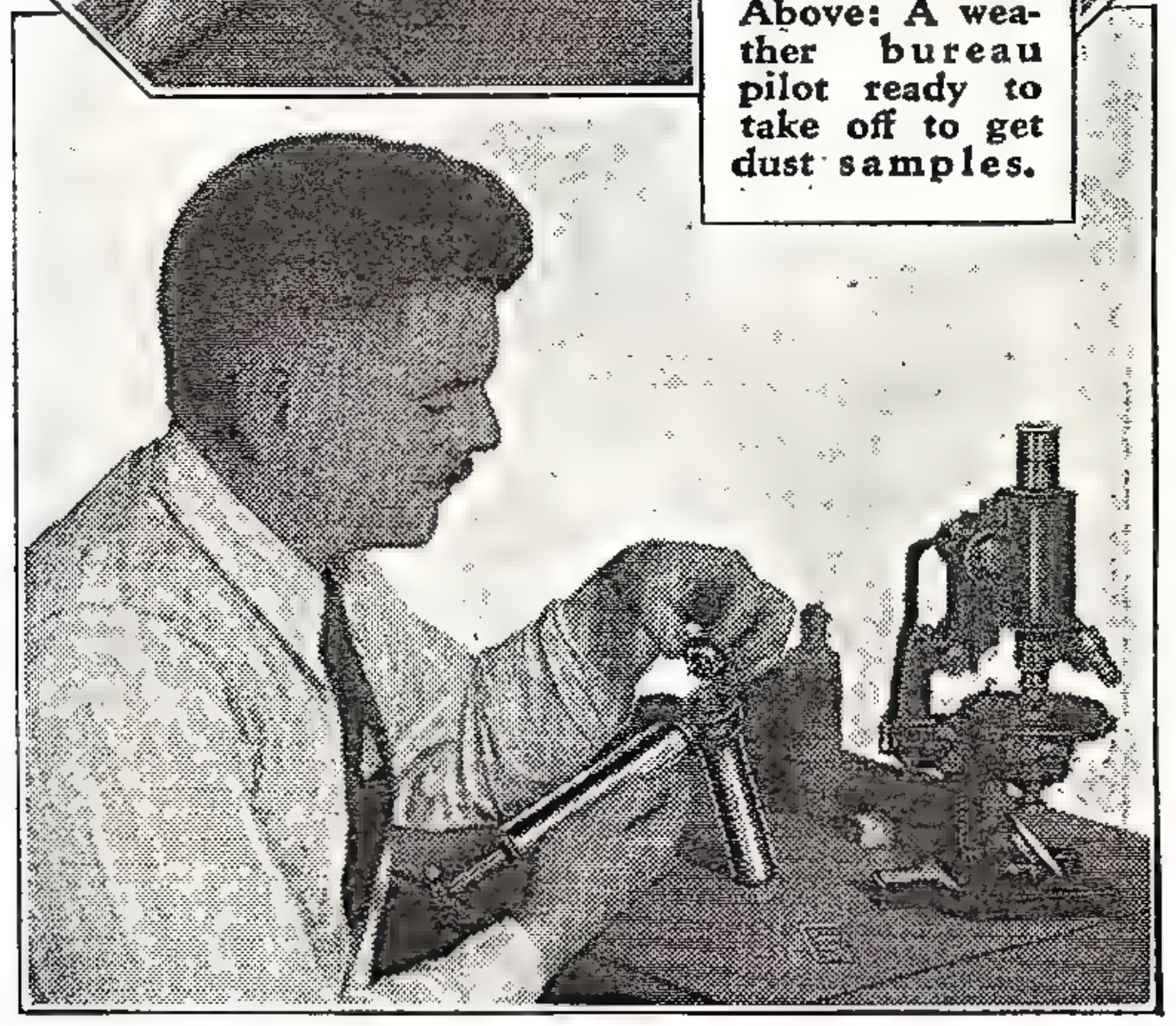


This exceptional view, taken by a weather bureau photographer, shows the dust storm sweeping down on a city in the Middle West. The cloud was 900 miles wide and moved 1,800 miles across the U. S. and on into the Atlantic ocean.

The "Black Blizzard" engulfing a midwestern city is strikingly shown here. The cloud completely shrouded the sun forcing automobile drivers to abandon their machines.



Above: A weather bureau pilot ready to take off to get dust samples.



Irving F. Hand, U. S. Weather Bureau aerial observer, is shown examining dust which he collected in his suction instrument. It showed 25,000 times more dust in the air. The dust particles were found to be twice the usual size.

How CARNIVAL Racketeers FLEECE the PUBLIC

Clever sharpers rob the public of vast sums in carnival games. This story reveals their secrets.

From the G-Wheel swindles to the bucket concessions, the odds are stacked against the bystander or "customer."

you can't win!
GEARS IN HUB OF WHEEL

Eager crowds, like that above, throng the carnivals and sideshows, squandering dimes and quarters on devices whose odds are fixed in favor of the operator. Right, a percentage wheel, in which the winning numbers are predetermined by a series of gears in the hub. Carnival confederates, knowing the various sequences, cover these numbers and walk off with the prizes.

by EARL CHAPIN

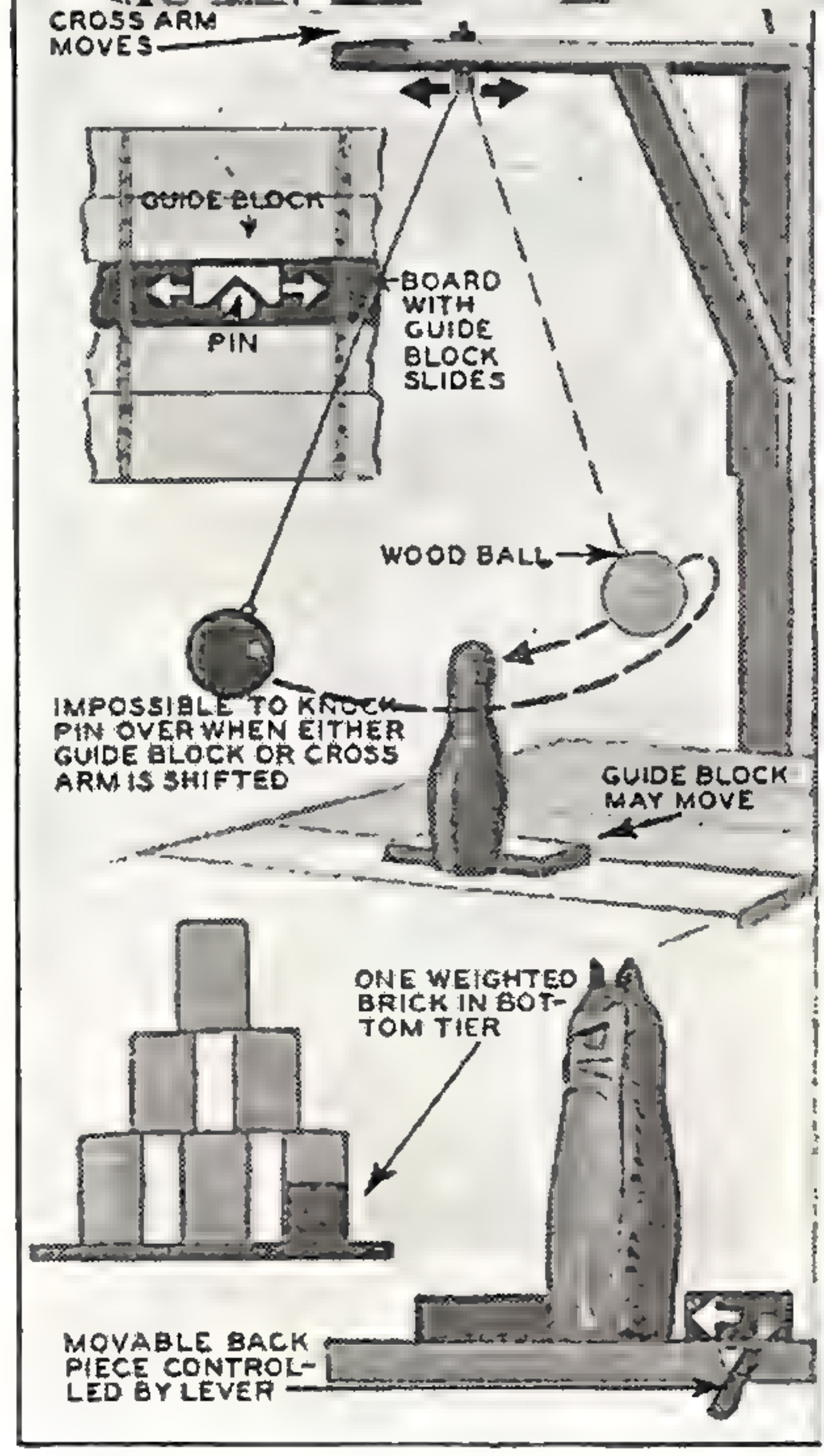
MILLIONS of dollars are taken from the public by clever operators of the smaller sideshows and carnivals who have capitalized upon the American love for games of chance.

Cries of "Try your luck" still meet with ready response despite the fact that one might as well back a three-legged horse to win the Derby as to buck the carnival games and gyp wheels. But the gullible bystander persists. He believes that luck and the law of averages has something to do with it—and he's right; but the luck is all with the operator. The player doesn't stand a chance. He can't win because the games are set against him.

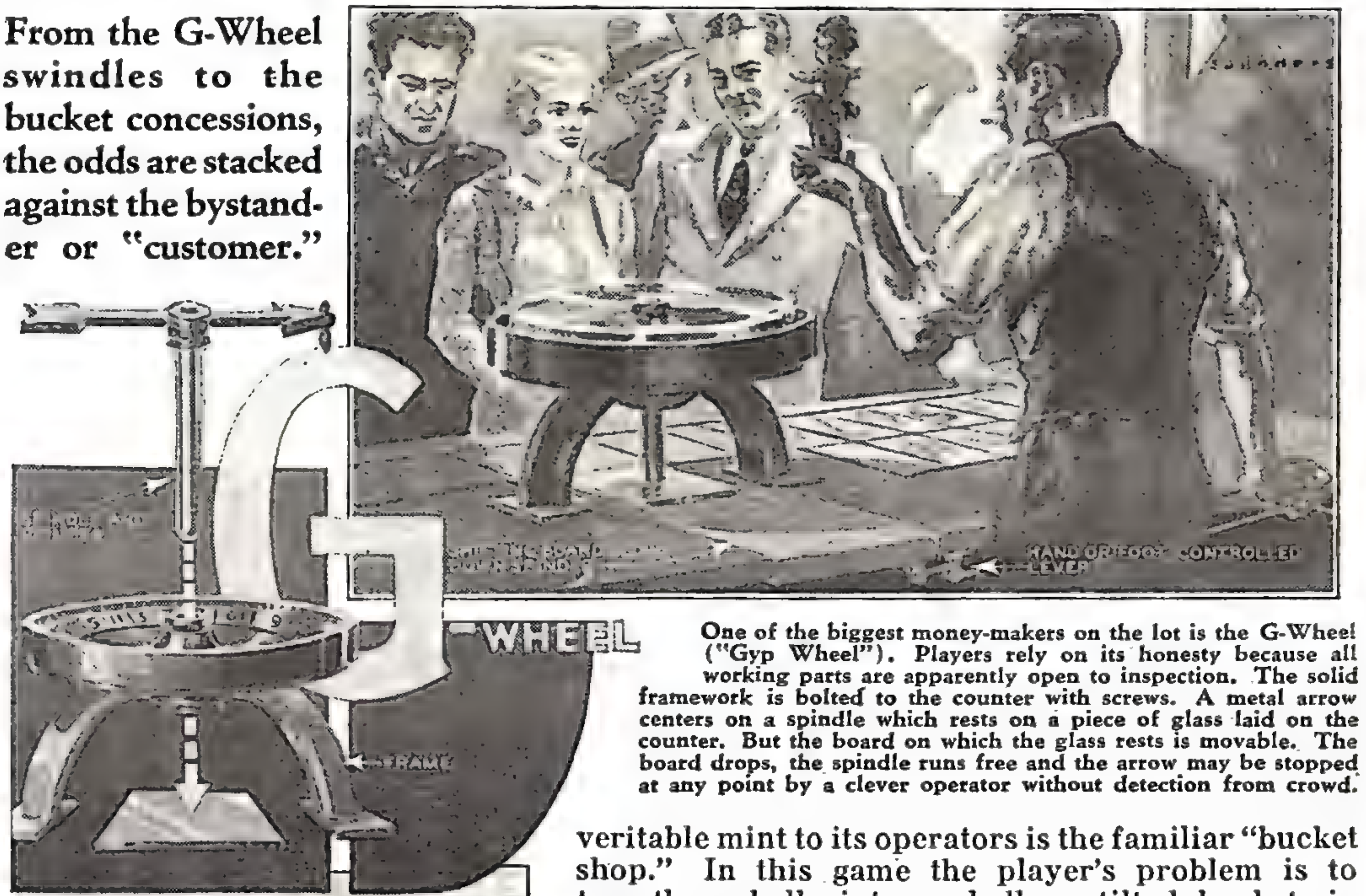
The Mechanism of the Ball and Tenpin Game

A good example of the mechanical ingenuity behind some of the devices used to fleece a customer is afforded by the familiar "Ball and Tenpin" game. A ball, suspended by a chain from a gibbet-like cross-arm, swings in an arc on a level that permits it to bowl over a tenpin set in a notch on the platform below. The player must release the ball in such a manner that it passes the pin going out, but bowls it over on the back swing. When the operator demonstrates the trick it looks amazingly simple; but, try as he will, the player cannot duplicate the performance. The secret lies in the fact that the tenpin isn't where it was when the operator was demonstrating a moment before. Not even the man who invented the trick could beat his own game now. By a simple mechanical adjustment the notch in which the tenpin rests may move, the entire board may move or the arc of the swinging ball may be changed.

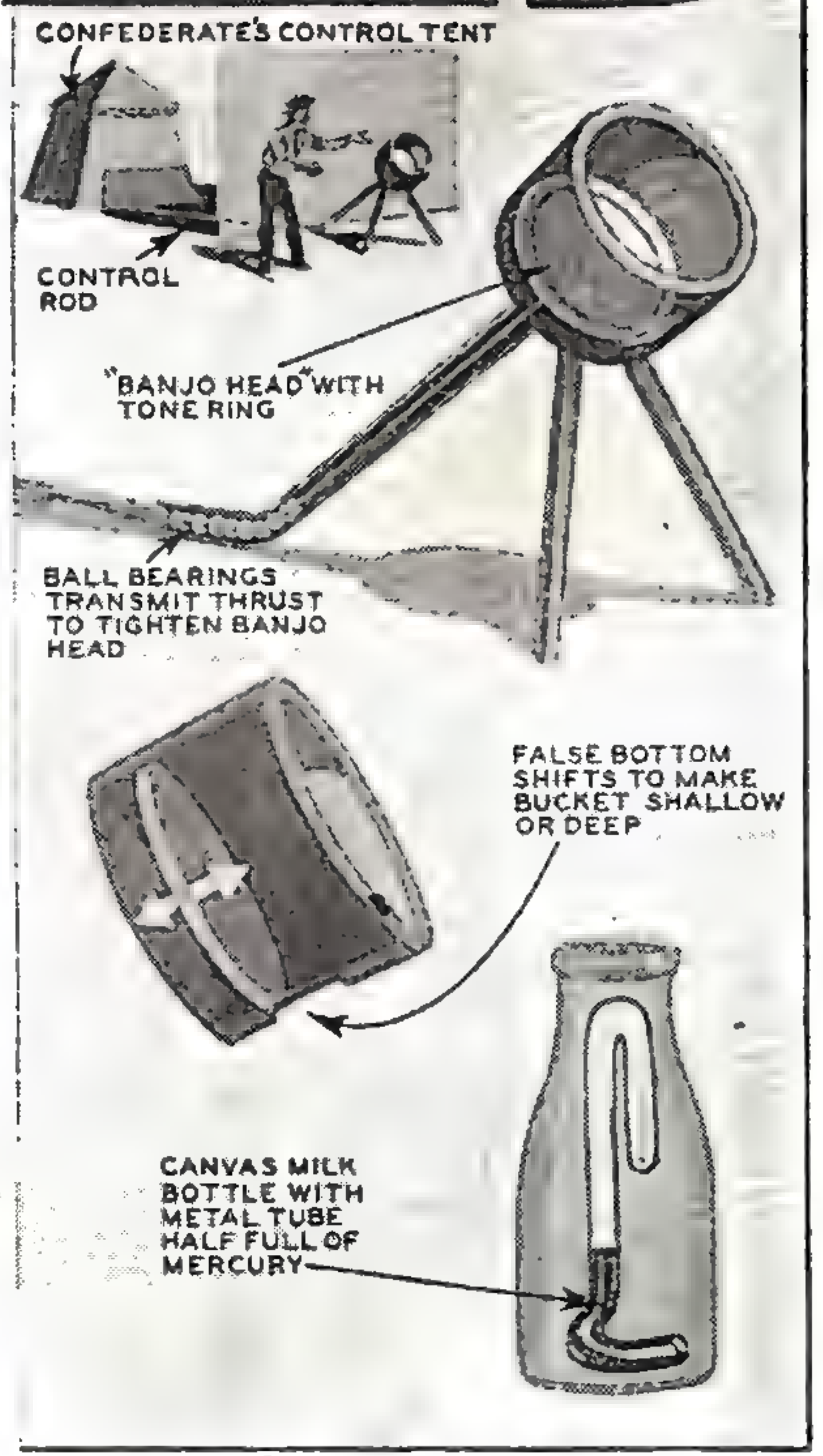
Another carnival racket which has proven a veritable mint to its operators is the familiar "bucket shop." In this game the player's problem is to toss three balls into a shallow, tilted bucket, in such a manner that the balls will not bounce out over the rim again, but instead roll out of the round hole on the downward side.


CROSS ARM MOVES
GUIDE BLOCK
BOARD WITH GUIDE BLOCK SLIDES
PIN
WOOD BALL
IMPOSSIBLE TO KNOCK PIN OVER WHEN EITHER GUIDE BLOCK OR CROSS ARM IS SHIFTED
GUIDE BLOCK MAY MOVE
ONE WEIGHTED BRICK IN BOTTOM TIER
MOVABLE BACK PIECE CONTROLLED BY LEVER

Above, three games which the player cannot beat. Diagram shows how tenpin game works. Weighted brick in pyramid cannot be knocked from counter. A lever locks the cat in place.


G
WHEEL
FRAME
HAND OR FOOT CONTROLLED LEVER

One of the biggest money-makers on the lot is the G-Wheel ("Gyp Wheel"). Players rely on its honesty because all working parts are apparently open to inspection. The solid framework is bolted to the counter with screws. A metal arrow centers on a spindle which rests on a piece of glass laid on the counter. But the board on which the glass rests is movable. The board drops, the spindle runs free and the arrow may be stopped at any point by a clever operator without detection from crowd.


CONFEDERATE'S CONTROL TENT
CONTROL ROD
"BANJO HEAD" WITH TONE RING
BALL BEARINGS TRANSMIT THRUST TO TIGHTEN BANJO HEAD
FALSE BOTTOM SHIFTS TO MAKE BUCKET SHALLOW OR DEEP
CANVAS MILK BOTTLE WITH METAL TUBE HALF FULL OF MERCURY

Above, control rods tighten the bucket bottom, making the balls bounce out. Right, mercury in milk bottle is shifted at will. When at bottom, the player cannot knock the bottle over.

While the operator drops the balls into the bucket with consummate ease, the player invariably tosses one ball a little too hard and it bounces out again. If the player scents trickery and protests, the operator may even take his bucket out onto the fairway and prove to his customer that he can still make his balls stay put. Convinced, the customer tries again, but with no more success than before.

Of course he can't win! The bucket has a false bottom which either permits or precludes the possibility of making a successful toss by the simple turn of a confederate's wrist.

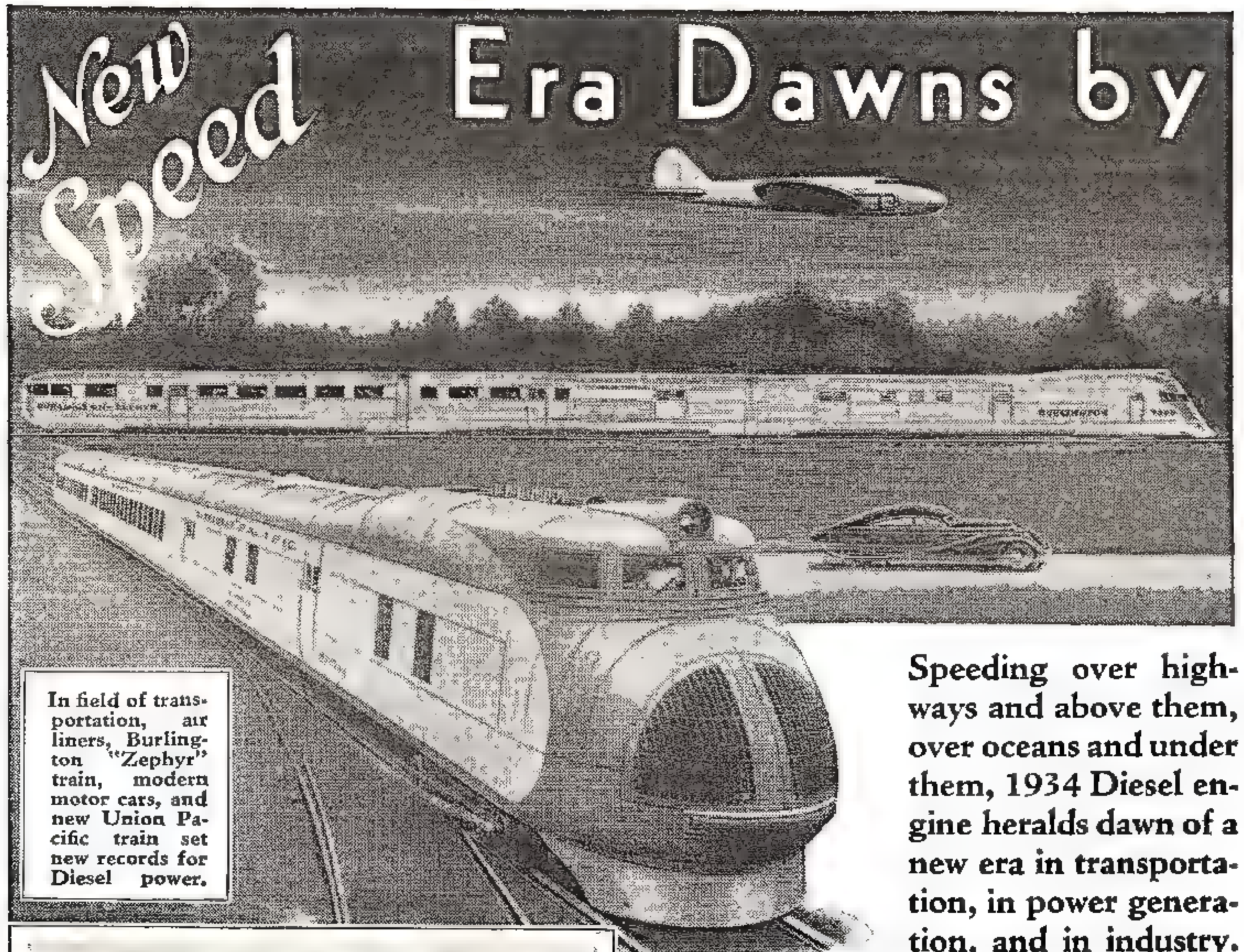
Why the Balls Bounce From the Bucket

The bucket may have either a "banjo head" bottom, or one which moves up or down, causing the receptacle either to be deep or shallow. The "banjo head" bottom is made of pliable material which is made taut or lax by the pressure of a circular piece of steel which acts in the same manner as the tone ring in expensive banjos. When the bottom is at its maximum springiness, the ball will bounce out no matter how easily it may be tossed.

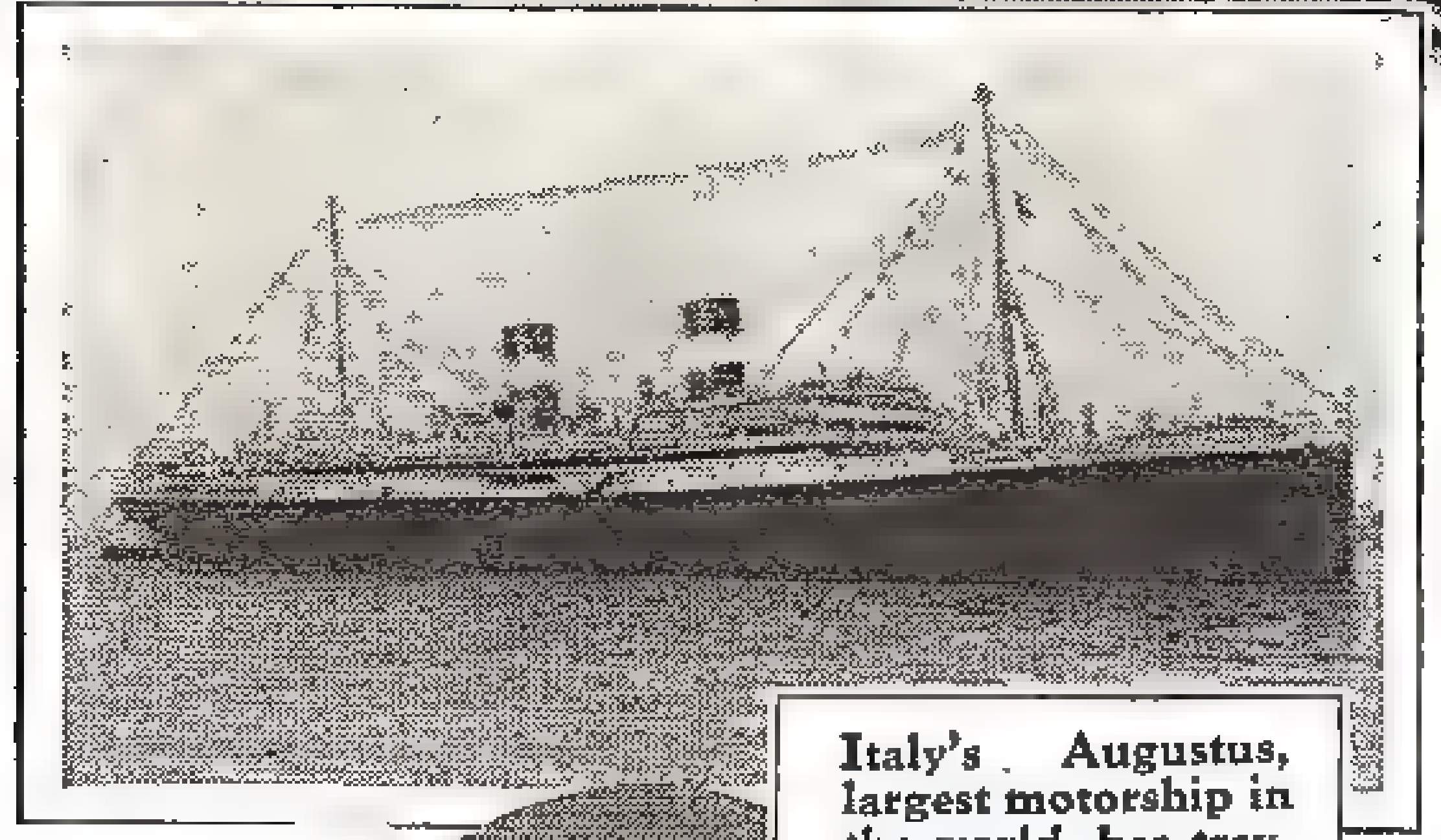
The operator communicates with his confederate by means of word signals included in his conversation with onlookers. The accomplice may be behind a curtain within the stand, or in a control room near by. Usually it is the latter case, for this arrangement avoids detection.

(Continued on page 124)

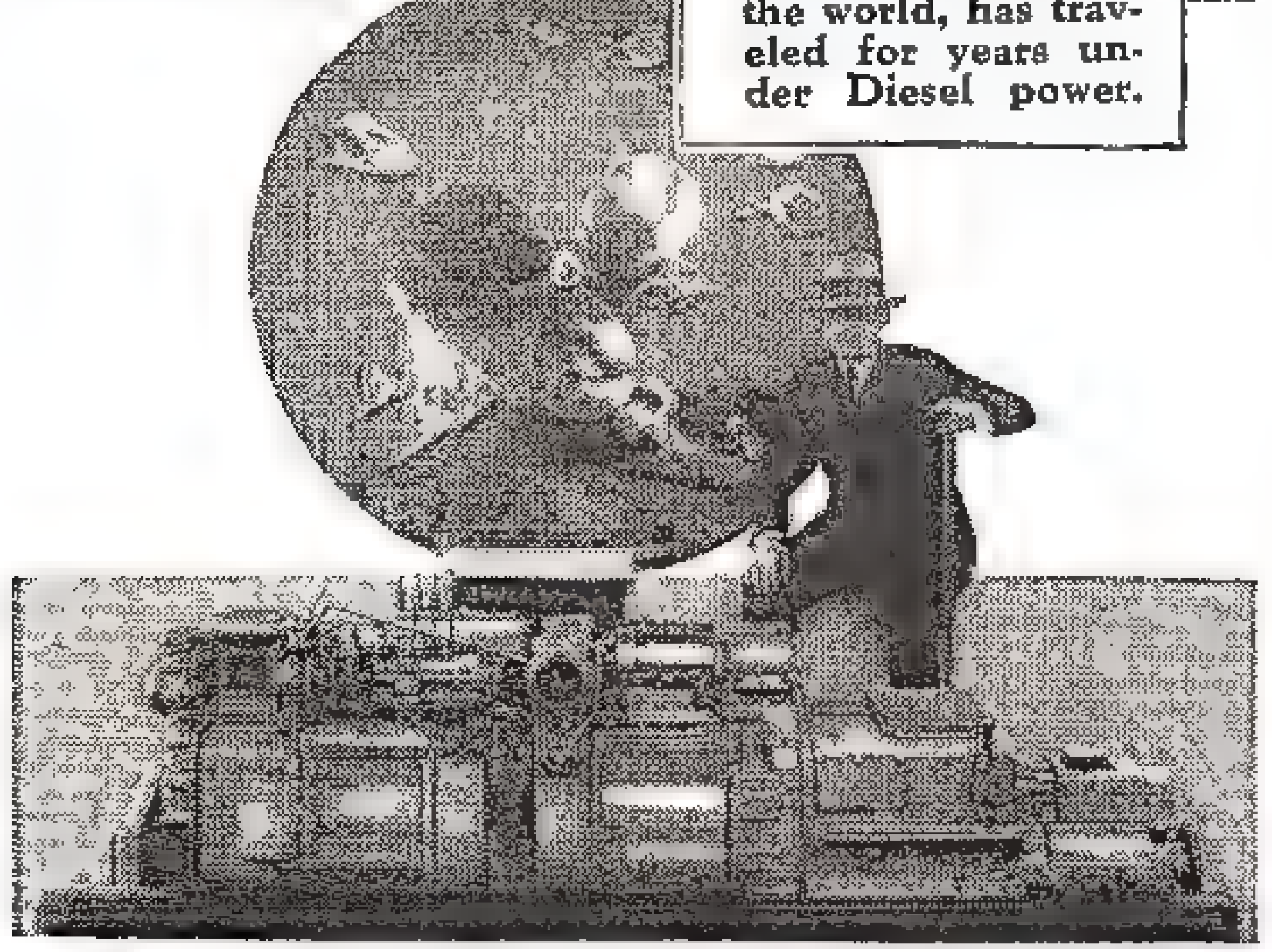
New Speed Era Dawns by Harnessing Diesel Power



In field of transportation, air liners, Burlington "Zephyr" train, modern motor cars, and new Union Pacific train set new records for Diesel power.



Italy's Augustus, largest motorship in the world, has traveled for years under Diesel power.



This Sterling crankless Diesel is designed chiefly for small marine craft. Direct-drive engine has low weight, high speed, and large power of gasoline engine. Cylinders are horizontal, permitting much lower engine construction. Low center of gravity makes engine ideal for war tanks, for powering gun carriages, and for autos. As in most Diesels compressed air in small pressure tank is used for starting.

Speeding over highways and above them, over oceans and under them, 1934 Diesel engine heralds dawn of a new era in transportation, in power generation, and in industry.

by ROBERT FAHERTY

THE Diesel era is arriving! Under high compression and with swift, sure strokes the Diesel engine is pounding its way into all corners of the world, bringing new speed and power to industry and to transportation.

The lowly "rational heat motor" patented by Dr. Rudolf Diesel in 1892, and considered an outlaw among engines for almost a score of years afterward, has today become a multitude of different Diesel types, all revolutionizing their respective fields in industry.

"The Diesel has got to come," says Henry Ford, as he experiments in his Fort Myers, Florida, workshop with some new idea for a Diesel engine. "I do not know or care in just what shape, but it is our business to find out."

Early Diesel engines were crude and bulky, suited only for stationary installations in power plants or perhaps on large ships. Modern engineering research has developed this first oil engine with swift progress to the point where, today, the Diesel engine is breaking new speed and power records on every hand.

The Diesel is an internal combustion engine without spark plugs. Air is compressed in the cylinders to pressures of from 375 to 600 pounds per square inch. So great is this compression that the air inside is heated to over 500 degrees Fahrenheit.

Fuel oil sprayed into this heated air immediately explodes. The easy ignition makes possible the use of crude oil or other cheap oil refining residues.

Larger Diesels can operate on cruder oil than can the light, high-speed Diesels used for transportation purposes. The cost of fuel therefore varies, but it is always less than that of kerosene or gasoline.

Railroads Use Diesels

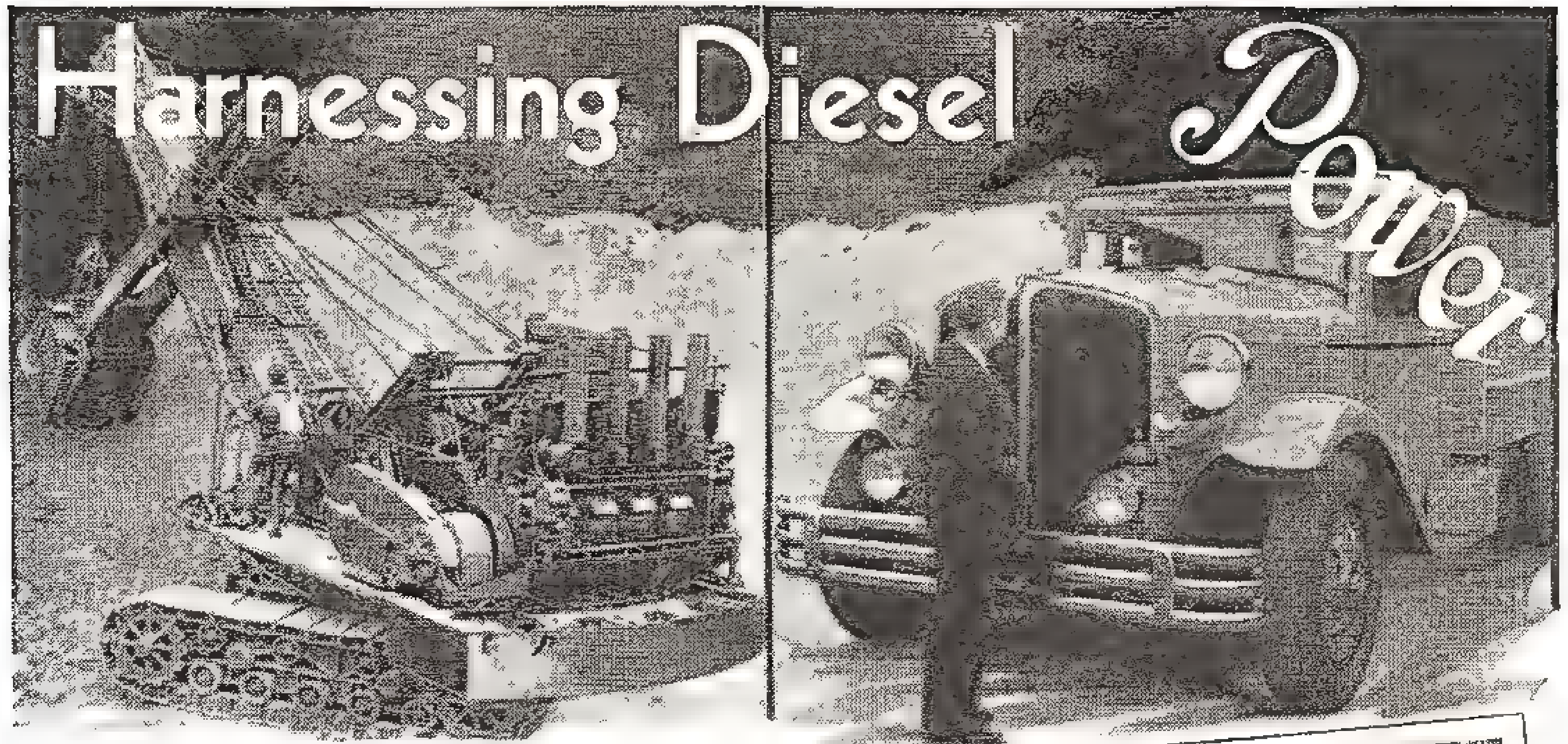
The Diesel engine is now coming into its own in the field of transportation. Railroads are putting out high speed, Diesel-powered trains with latest of modern conveniences in a determined attempt to regain traffic lost to the busses and to automobiles.

The Burlington "Zephyr," an ultra-modern and stream-lined three-car train, depends on an 8-cylinder, 600-h.p. oil-burning Diesel for its absolutely safe cruising speed of over 100 miles an hour.

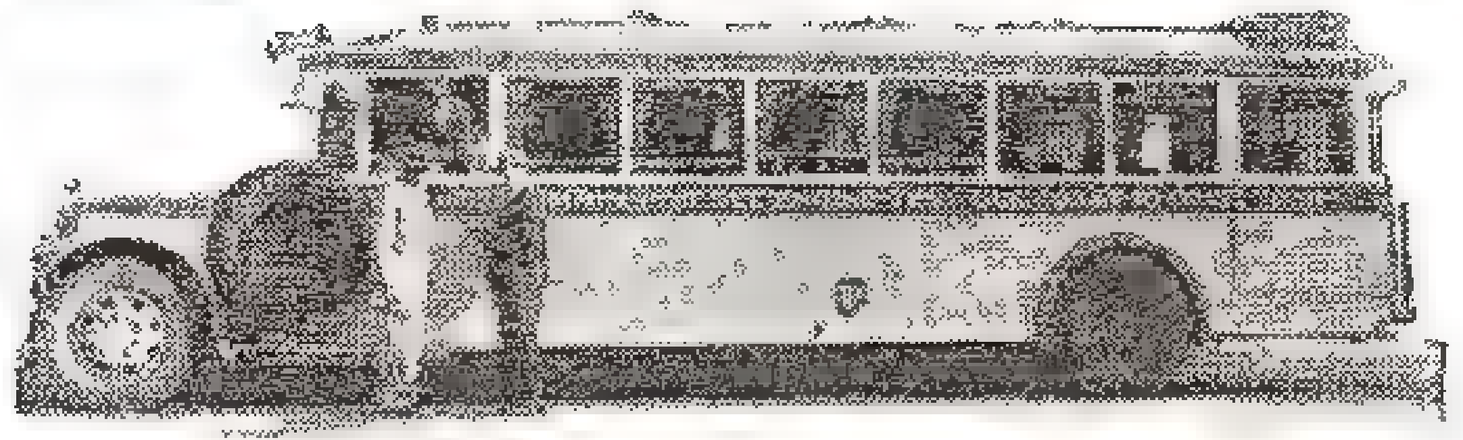
The second of Union Pacific's "Trains of Tomorrow," now being completed, will use a 12-cylinder V-type Diesel. The first of these trains, though powered with a 600 h.p. distillate-burning engine, has already set new records for speed and economy of operation in its exhibition tours of the country. With Diesel power the train can carry enough fuel for a 1,200-mile run. An ordinary steam locomotive must re-coal every 100 miles.

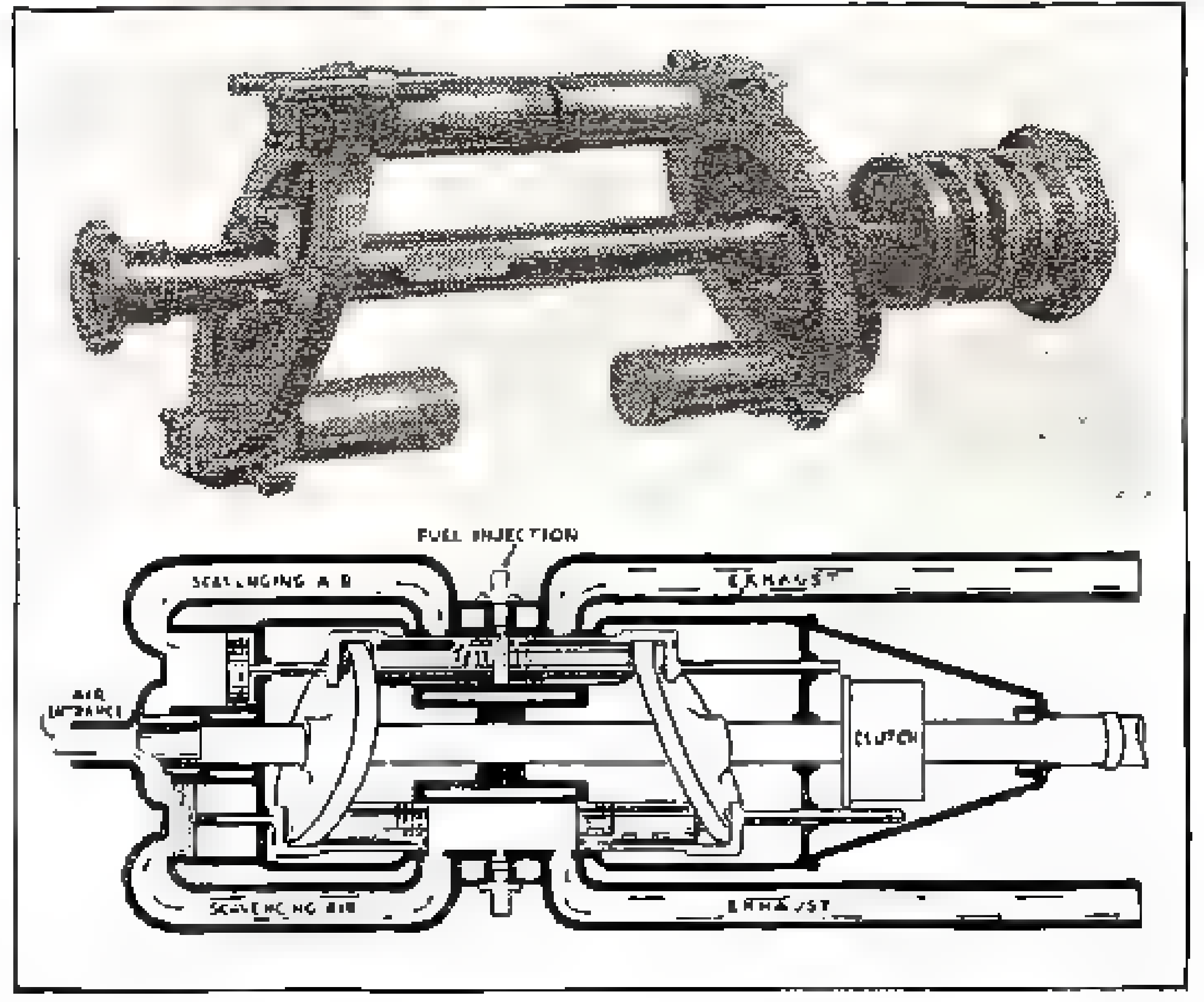
A small Diesel in the new streamlined railcar of the Great Western Railway in England gives almost entirely automatic

(Continued on page 120)

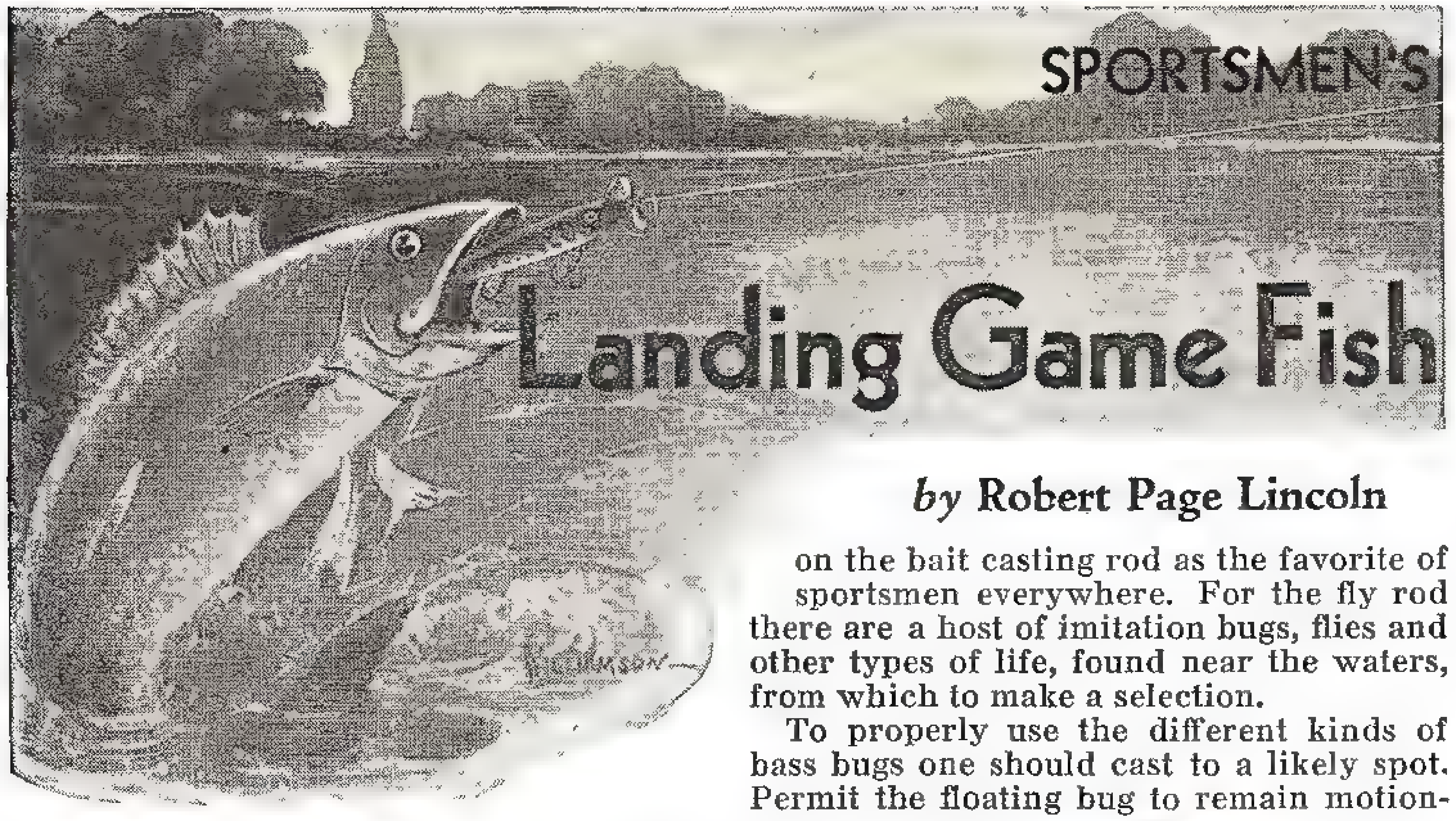


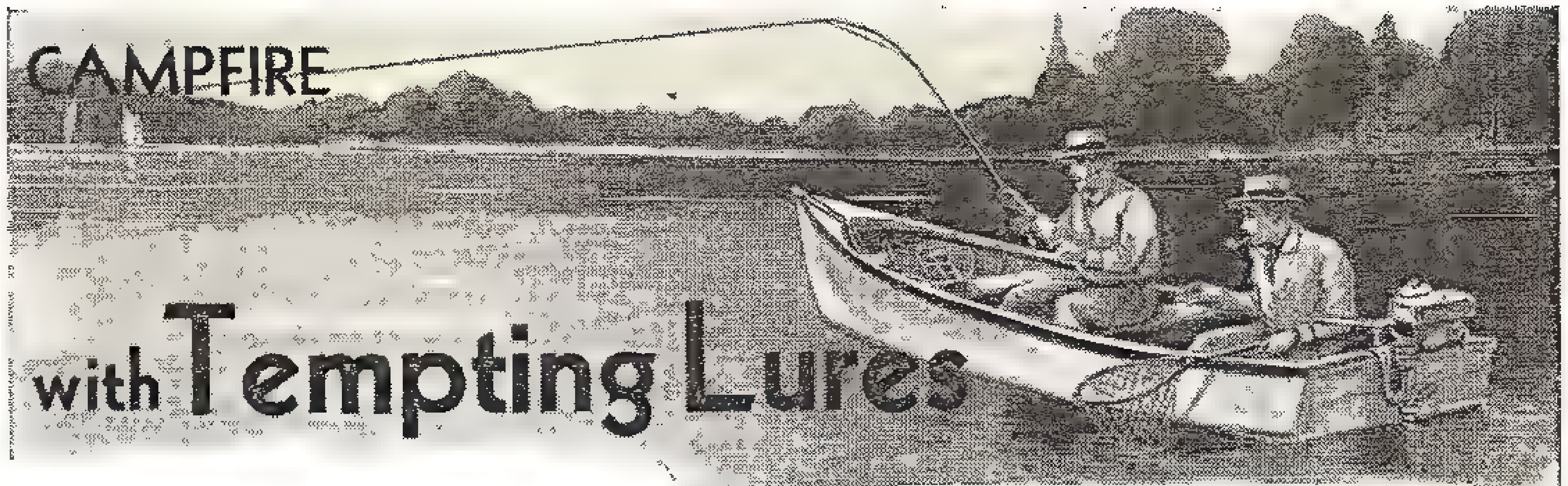
Conventional Diesel engine pictured at right is harnessed in many ways to supply power needs of industry. Power shovels, huge motor trucks, freight locomotives, and cross-country busses all herald the dawn of the Diesel era. New starter equipment permits Diesels to be used anywhere.





Top diagram shows relative positions of opposed pistons and tilted discs of new Sterling crankless Diesel. As many as six cylinders may be grouped around disc. Special bearings convert back and forth motion of pistons into rotary motion of drive shafts at each end of engine. Below: Arrangement of intake and exhaust manifolds is simple.





SPORTSMEN'S CAMPFIRE

Landing Game Fish with Tempting Lures

by Robert Page Lincoln

Hundreds of lures are available to the fisherman. The problem is to use and select them effectively. An ace of anglers here tells you just how to get good results with artificial bait.

ARTIFICIAL lures have become so popular that they have practically replaced live bait with sportsmen. These plugs, bugs, flies and spoons have increased in numbers so greatly that there literally are thousands on the market.

Indeed each of these lures has some merit and in most cases proves more killing than many a live bait. The fisherman now has hundreds of patterns from which to choose and without a doubt can find a lure to resemble any of the live types.

Lures Should Imitate Live Bait

Sportsmen who claim that this or that lure is useless in tempting game fish often are mistaken. Usually the difficulty lies not with the lure, but with the fisherman's manner of handling it.

It must be remembered that a lure usually is intended to imitate some form of life sought as food by fish. To properly use such a lure, therefore, the fisherman must, as nearly as possible, imitate the actions of the artificial bug, fly, minnow, or animal he is using so as to completely fool the wary denizens of the streams and lakes.

Artificial bait is either of the underwater or floating type. So popular has the latter become that the fly rod is rapidly gaining on the bait casting rod as the favorite of sportsmen everywhere. For the fly rod there are a host of imitation bugs, flies and other types of life, found near the waters, from which to make a selection.

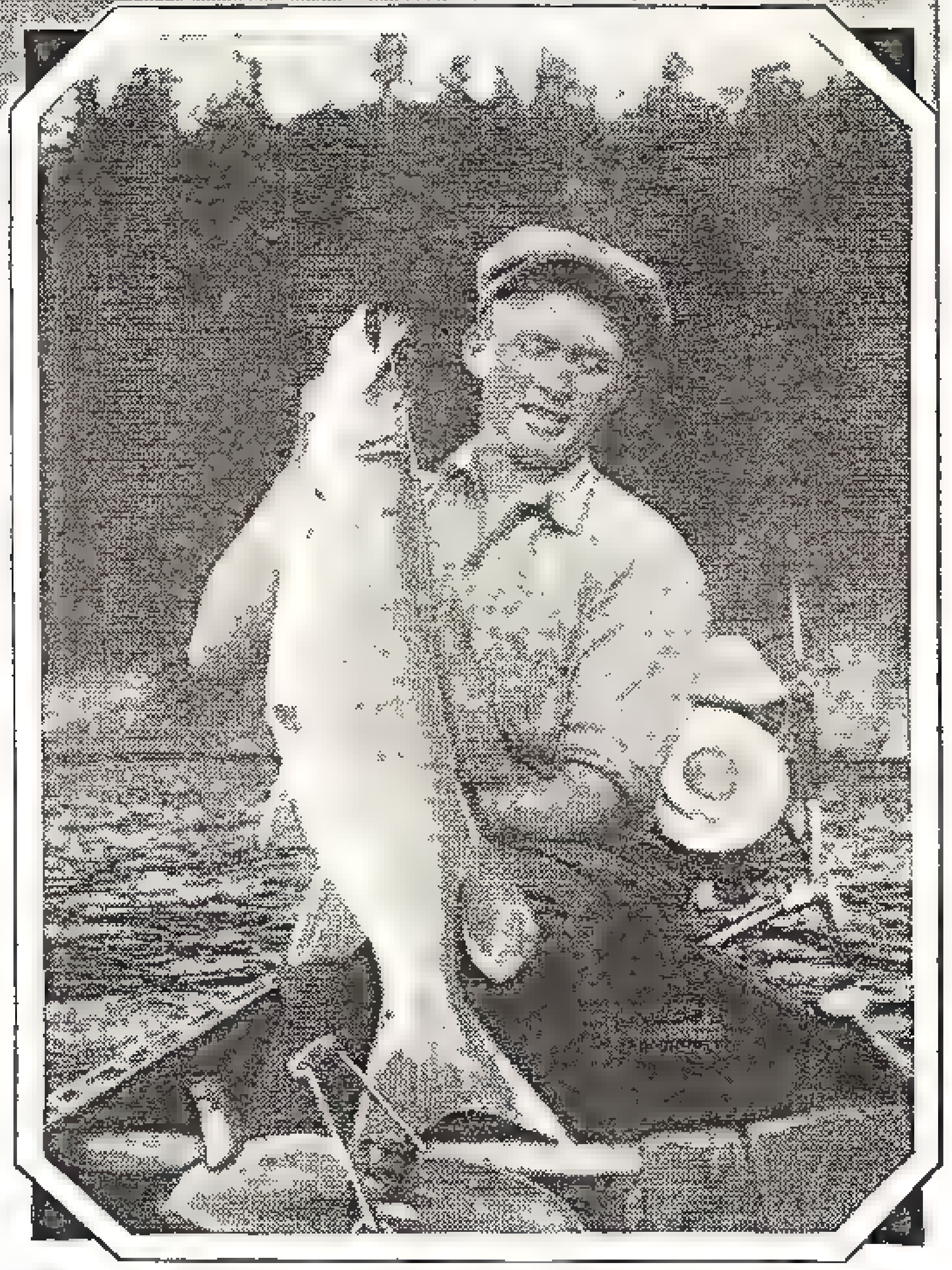
To properly use the different kinds of bass bugs one should cast to a likely spot. Permit the floating bug to remain motionless for a few moments on the water. This will give the bass, who may have noted the drop of the lure, time to inspect it. No strike occurring, move the bug forward a few inches. If the bass fails to dart at it, again let the bug remain motionless when he may seize it. Repeat the procedure a third time. If it fails, cast to another spot. The writer has found this one of the most successful ways of using the bass bug.

Here the author displays bass caught with artificial lures.

When to Set Hook for Bass

Select your lure to correspond with the type of insect found on the water and the time of day you are fishing. In the evening, when bass feed heavily, pick the night rovers of the air, such as grasshoppers, beetles, moths and dragon flies. Lifelike imitations of all of these can be found in any sporting goods house.

Deep pools close to shore are favorite locations for casting your floating lure in the evening. At that time all manner of life moves to the water's edge, including frogs, mice and crayfish and the bass is there to catch all he can. Cast as close as possible to the shore, sometimes letting the bait land right on the bank. Pull it into the water to give it some semblance of life.

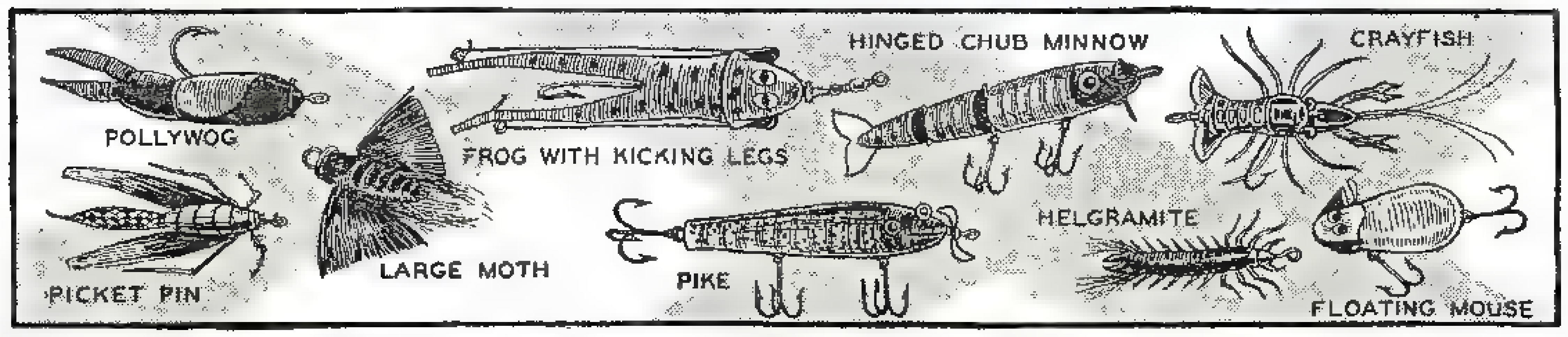


Big muskelunge, like the one shown above, are taken with large-size minnow imitations and spoons. This Rainy River guide landed this monster in White Fish Bay, Minnesota.

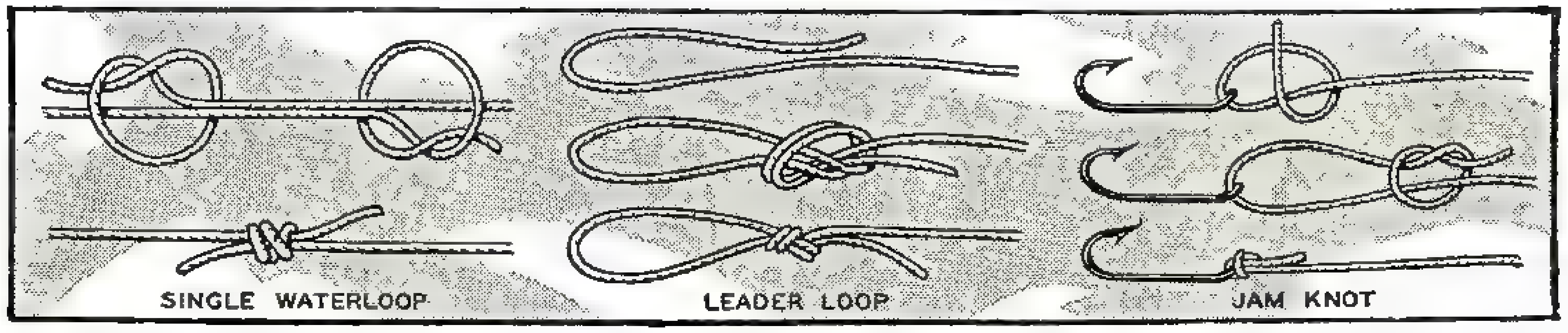
If the bass rises out of the water, creating a disturbance, do not set the hook. It is generally unknown that the bass disturbs water around a bug to wet it down so that it can not rise. Then the fish turns around and seizes its prey. Attempting to set the hook too quickly is a common fault and the reason why so many big ones get away. It is difficult to give proper directions on this point. It is something that comes instinctively after practice.

One of the most tempting lures is the mouse imitation, usually made of bucktail

(Continued on page 130)

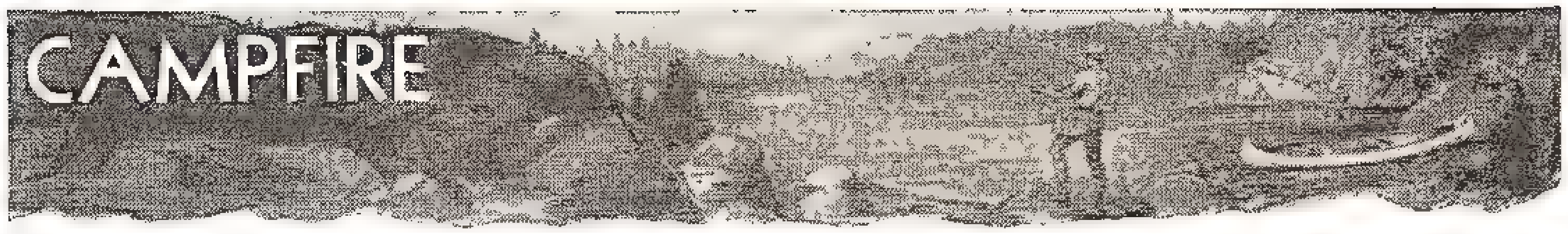


A few of the popular lifelike lures are shown above. There are a great variety of others that are equally effective for hooking game fish. All types of life eaten as food by fish are being imitated. The sizes vary for different fish.

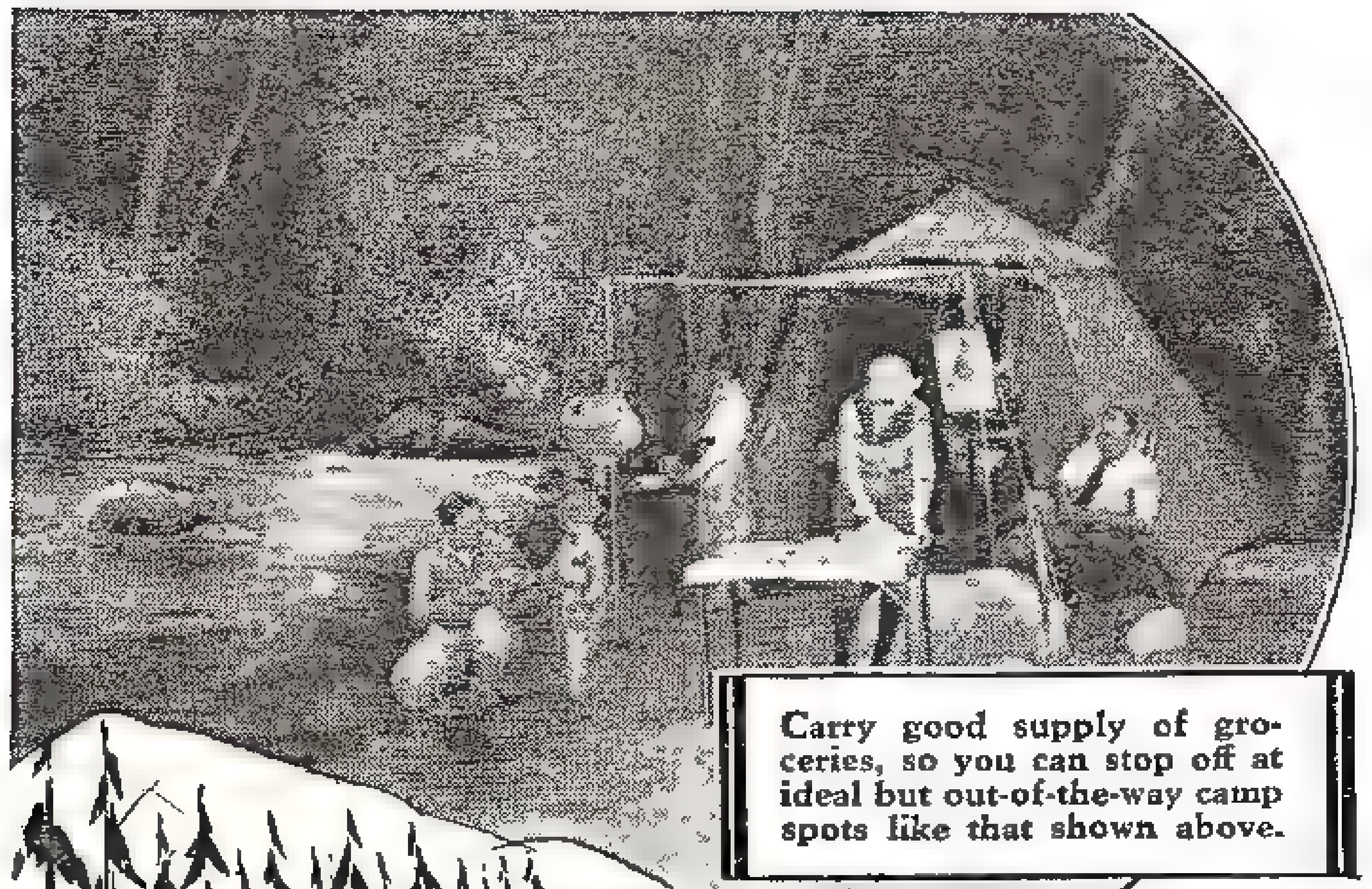


Here are three knots that are very useful to fishermen. The jam knot is commonly used for fixing the line to hook or leader loop. The waterloop knot is excellent for typing leader ends. The leader loop shown will not slip.

SPORTSMEN'S



Camper Kinks That Simplify the Tasks of Auto Tourists



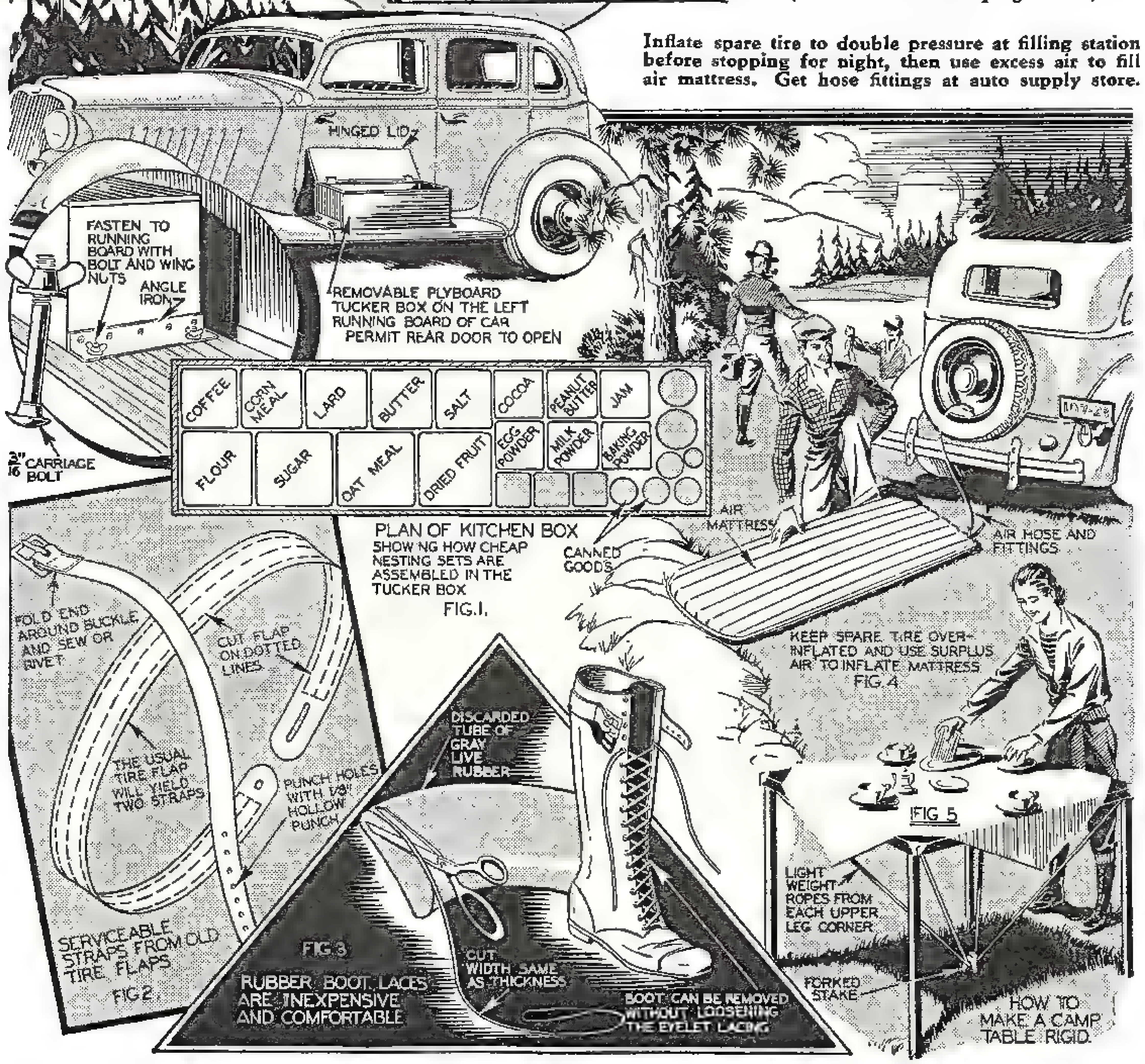
Carry good supply of groceries, so you can stop off at ideal but out-of-the-way camp spots like that shown above.

THE few short weeks allotted to most of us for a vacation period can be made much more enjoyable, should we choose auto touring, if we carefully plan ahead of time for the needs of the trip.

These suggestions for auto tourists, as well as a few "do's" and "don'ts," have all been tried out and approved by experienced campers.

The larder or "tucker box" is perhaps the most important part of the camping equipment. Always carry at least a

(Continued on page 128)


HINGED LID
FASTEN TO RUNNING BOARD WITH BOLT AND WING NUTS
ANGLE IRON
REMOVABLE PLYBOARD TUCKER BOX ON THE LEFT RUNNING BOARD OF CAR PERMIT REAR DOOR TO OPEN
3/16" CARRIAGE BOLT
COFFEE
CORN MEAL
LARD
BUTTER
SALT
COCOA
PEANUT BUTTER
JAM
FLOUR
SUGAR
OAT MEAL
DRIED FRUIT
EGG POWDER
MILK POWDER
BAKING POWDER
CANNED GOODS
AIR MATTRESS
AIR HOSE AND FITTINGS
FOLD END AROUND BUCKLE AND SEW OR RIVET
CUT FLAP ON DOTTED LINES
THE USUAL TIRE FLAP WILL YIELD TWO STRAPS
PUNCH HOLES WITH 1/8" HOLLOW PUNCH
DISCARDED TUBE OF GRAY LIVE RUBBER
CUT WIDTH SAME AS THICKNESS
BOOT CAN BE REMOVED WITHOUT LOOSENING THE EYELET LACING
LIGHT WEIGHT ROPES FROM EACH UPPER LEG CORNER
FORKED STAKE

Inflate spare tire to double pressure at filling station before stopping for night, then use excess air to fill air mattress. Get hose fittings at auto supply store.

PLAN OF KITCHEN BOX SHOWING HOW CHEAP NESTING SETS ARE ASSEMBLED IN THE TUCKER BOX FIG. 1.

SERVICEABLE STRAPS FROM OLD TIRE FLAPS FIG 2.

FIG 3 RUBBER BOOT LACES ARE INEXPENSIVE AND COMFORTABLE

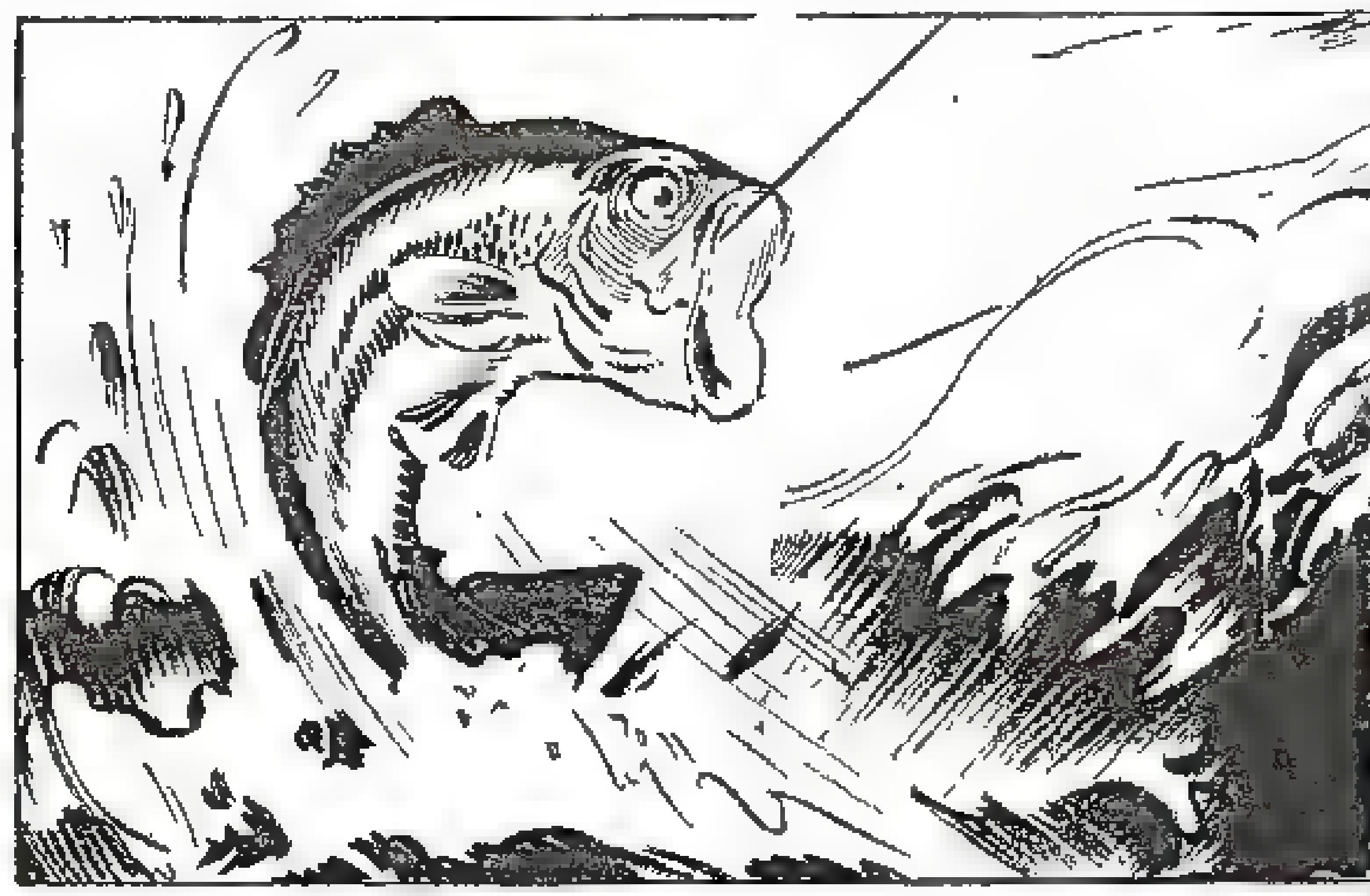
KEEP SPARE TIRE OVER-INFLATED AND USE SURPLUS AIR TO INFLATE MATTRESS FIG. 4

FIG 5 HOW TO MAKE A CAMP TABLE RIGID.

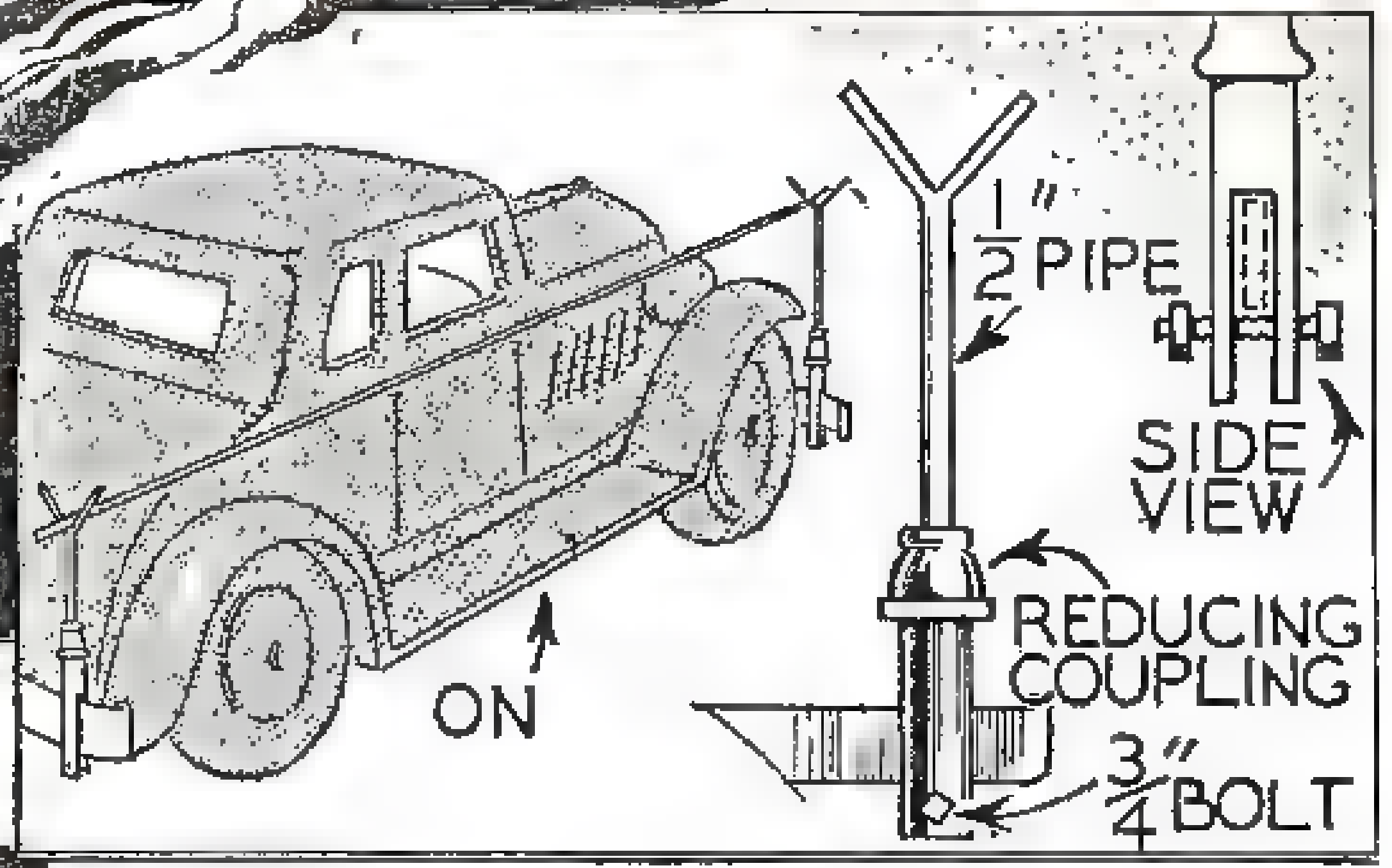
Fishing Handikinks That Will Save Money for the Angler

FISHING rods, be they bamboo or steel, are a vitally important part of any angler's kit. The long bamboo pole without frills will always be a favorite with followers of Izaak Walton, but this fact remains—it is a nuisance to carry around.

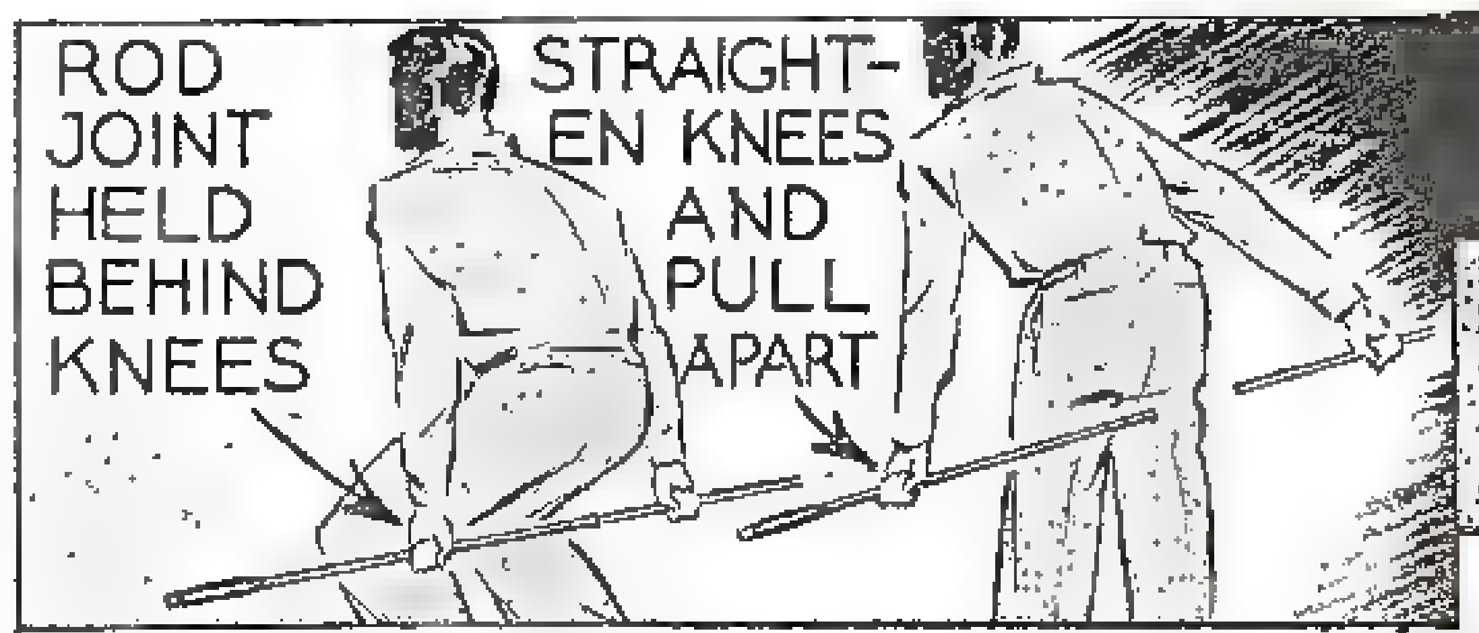
If one has a car, a pole carrier can be fashioned in a few minutes out of scrap pipe fittings. This carrier bolts on to the front and rear bumpers, and so can be removed very easily. The poles are tied in the forked tops of the pipes.



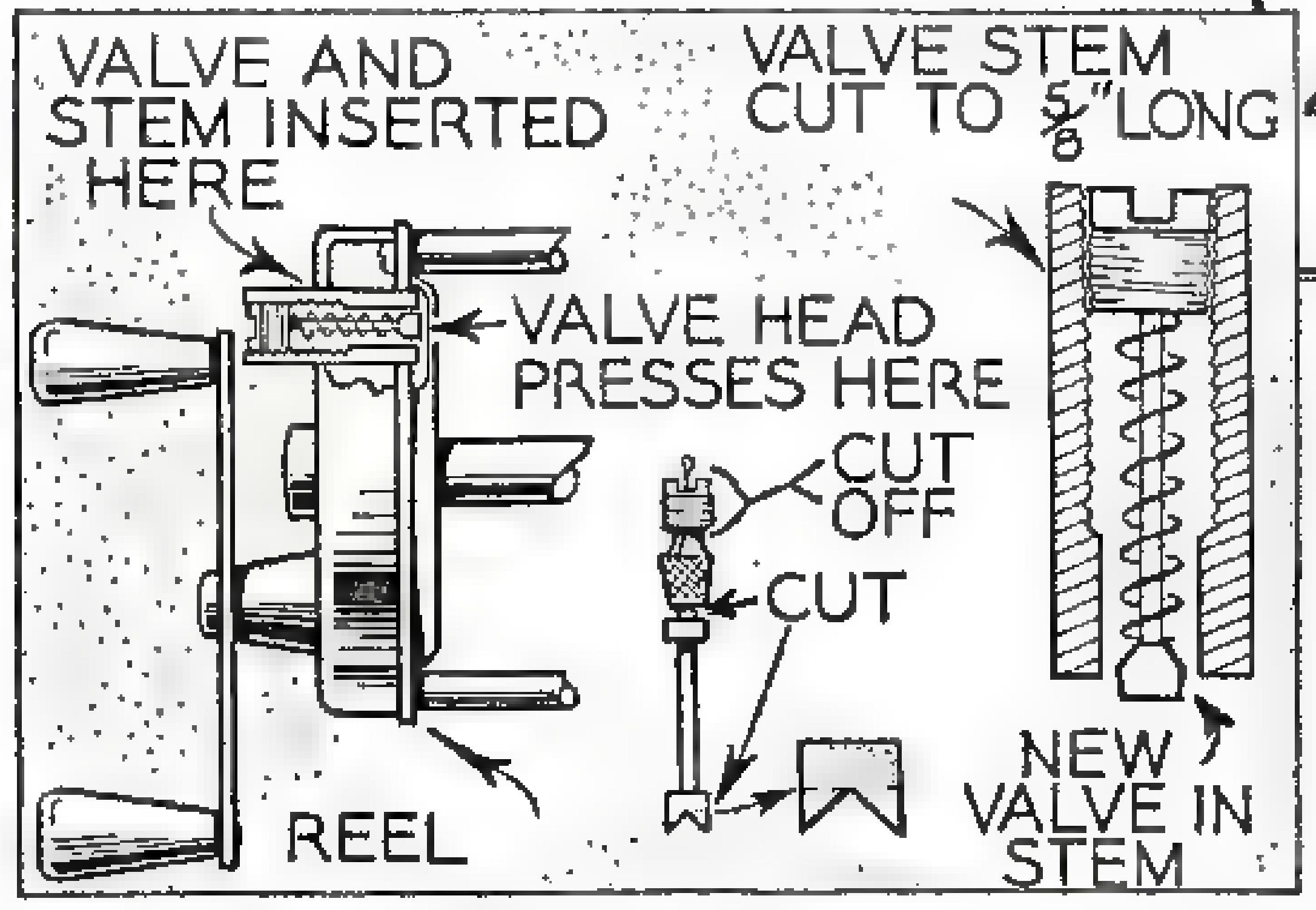
Below: When rod ferrules stick, warm joint with match, then hold behind knees, straighten knees and spread them apart.

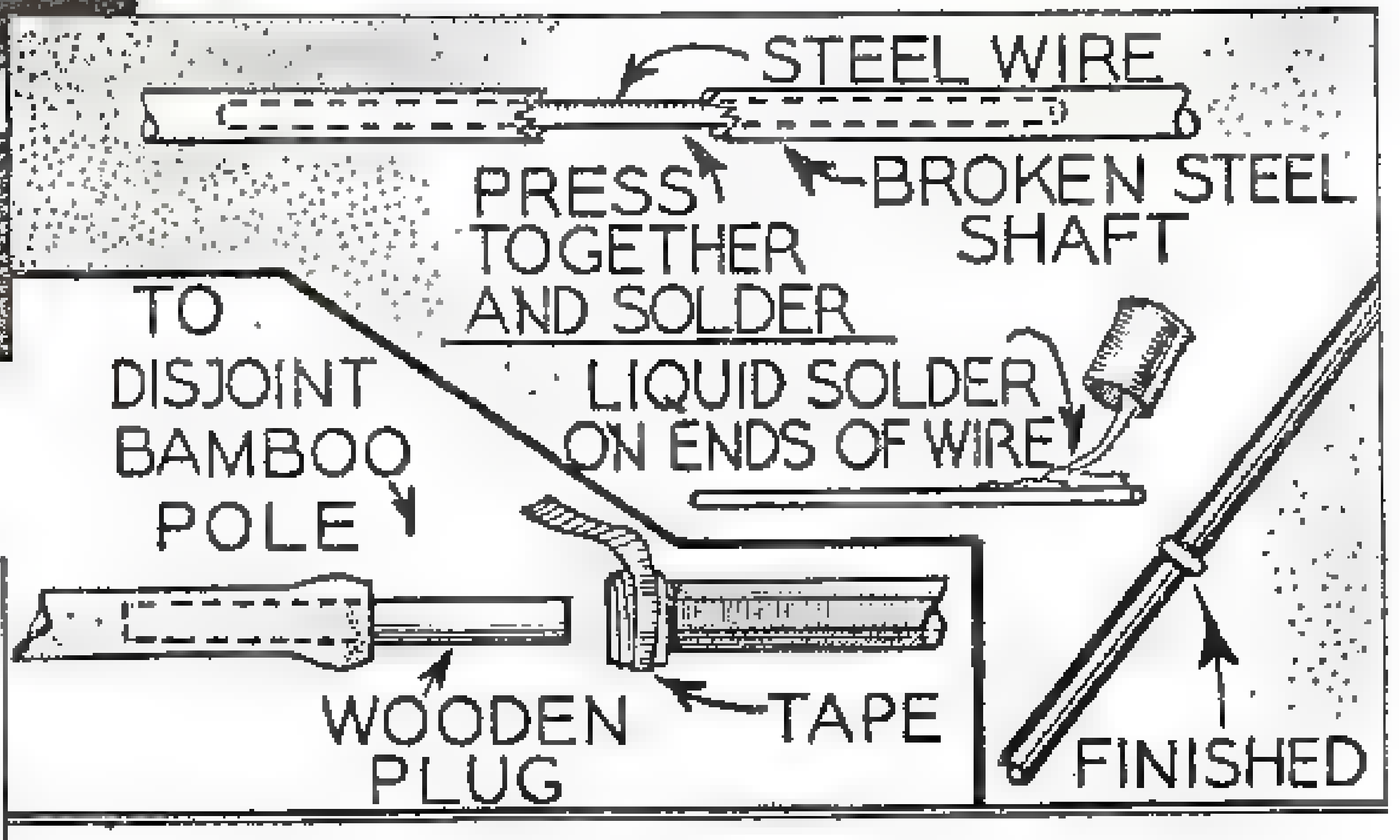

1/2" PIPE
SIDE VIEW
REDUCING COUPLING
ON
3/4" BOLT

Method for carrying fishpoles. Slot pipe to slip over bumper. Split top end of 1/2" pipe to form fork.


ROD JOINT HELD BEHIND KNEES
STRAIGHTEN KNEES AND PULL APART

To make adjustable anti-backlash drag for reel, solder 5/8" length of valve stem to end plate. Cut off valve as shown below. Turn with valve cap to adjust pressure.


VALVE AND STEM INSERTED HERE
VALVE STEM CUT TO 5/8" LONG
VALVE HEAD PRESSES HERE
CUT OFF
CUT
NEW VALVE IN STEM
REEL


STEEL WIRE
PRESS TOGETHER AND SOLDER
BROKEN STEEL SHAFT
TO DISJOINT BAMBOO POLE
LIQUID SOLDER ON ENDS OF WIRE
WOODEN PLUG
TAPE
FINISHED

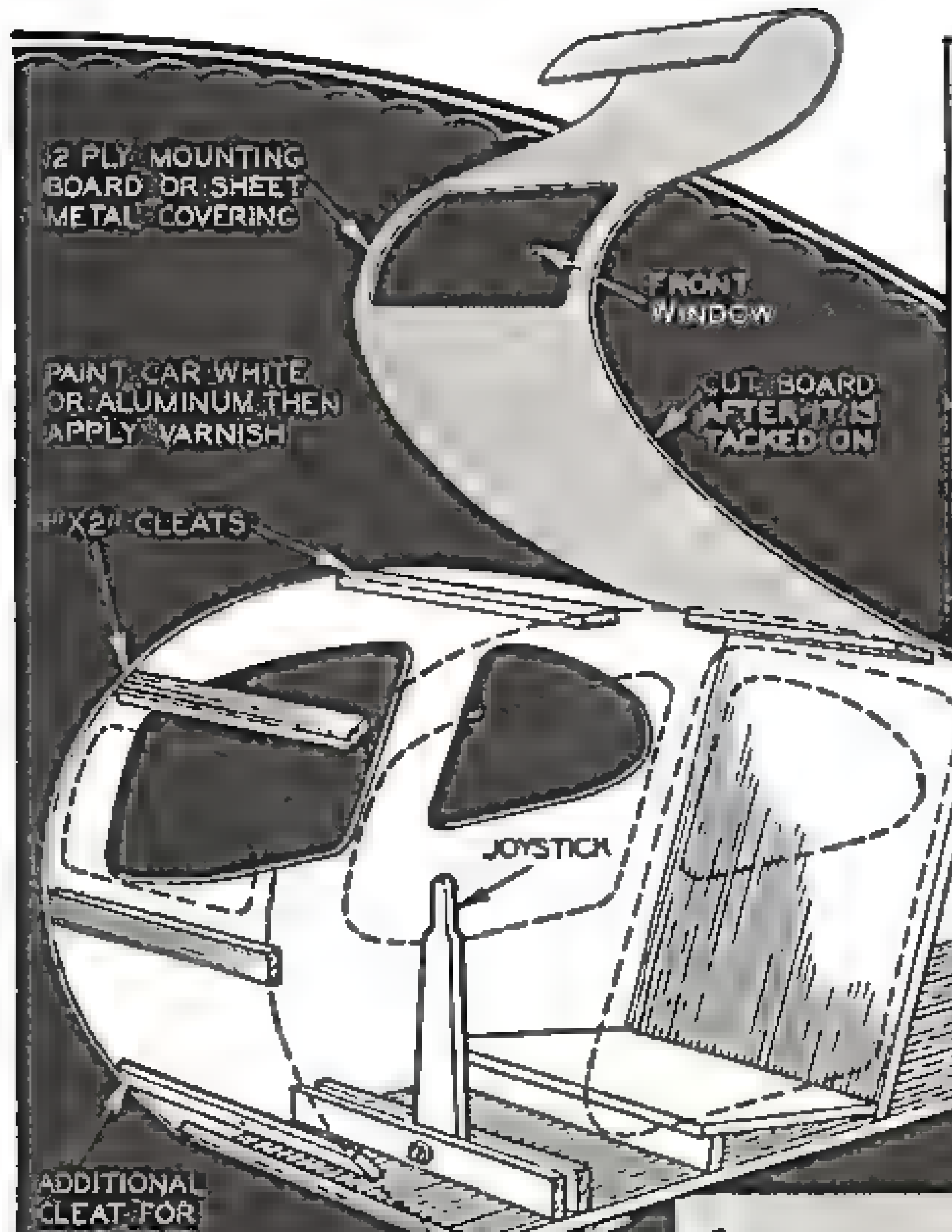
To repair broken steel rods, get length of spring steel wire which just fits inside rod. Smear liquid solder on wire, press into broken rod ends, and smooth joint. To make joints in bamboo pole saw into 4-ft. lengths at knuckles, drill holes, and glue in wooden plugs which make snug fit.

Bamboo poles can be readily disjointed and carried inside the car. Drill 4" deep holes, and glue wooden plugs into one end of each section. Reinforce the bamboo ends with tape or stove pipe wire.

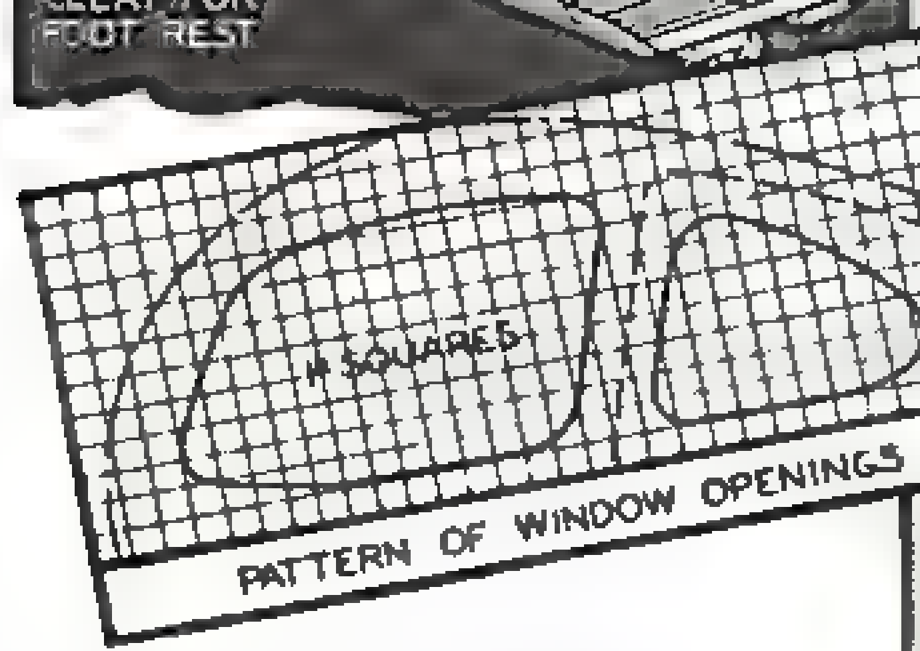
Streamlined SCOOTER *Steers* *with* AIRPLANE JOYSTICK

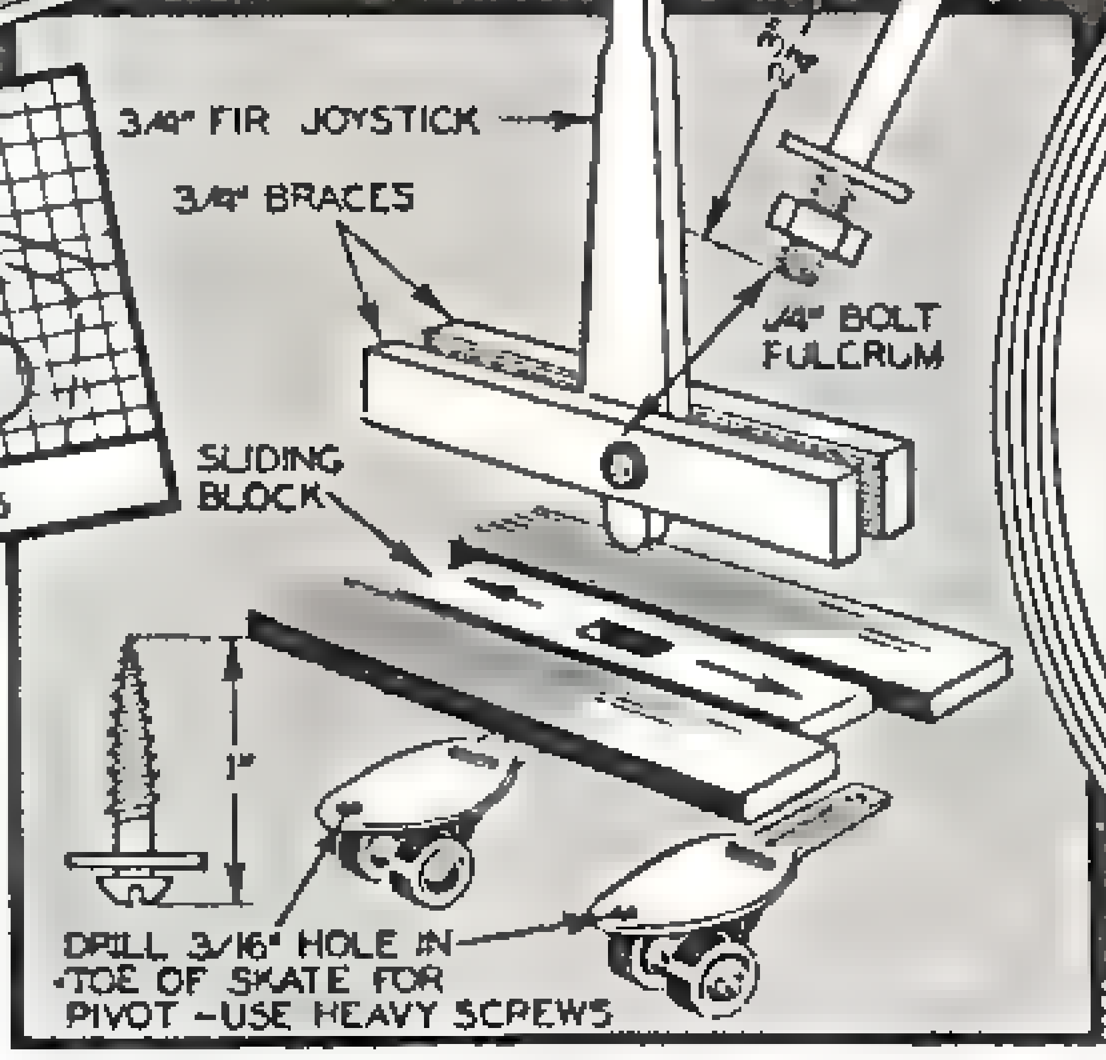
"Tear drop" streamlining with airplane type control gives this cabin scooter an appeal that no boy can resist. Young and old alike will stop to watch when this streamlined pushmobile job is brought out on the sidewalk for its first test run.

by WESTON FARMER

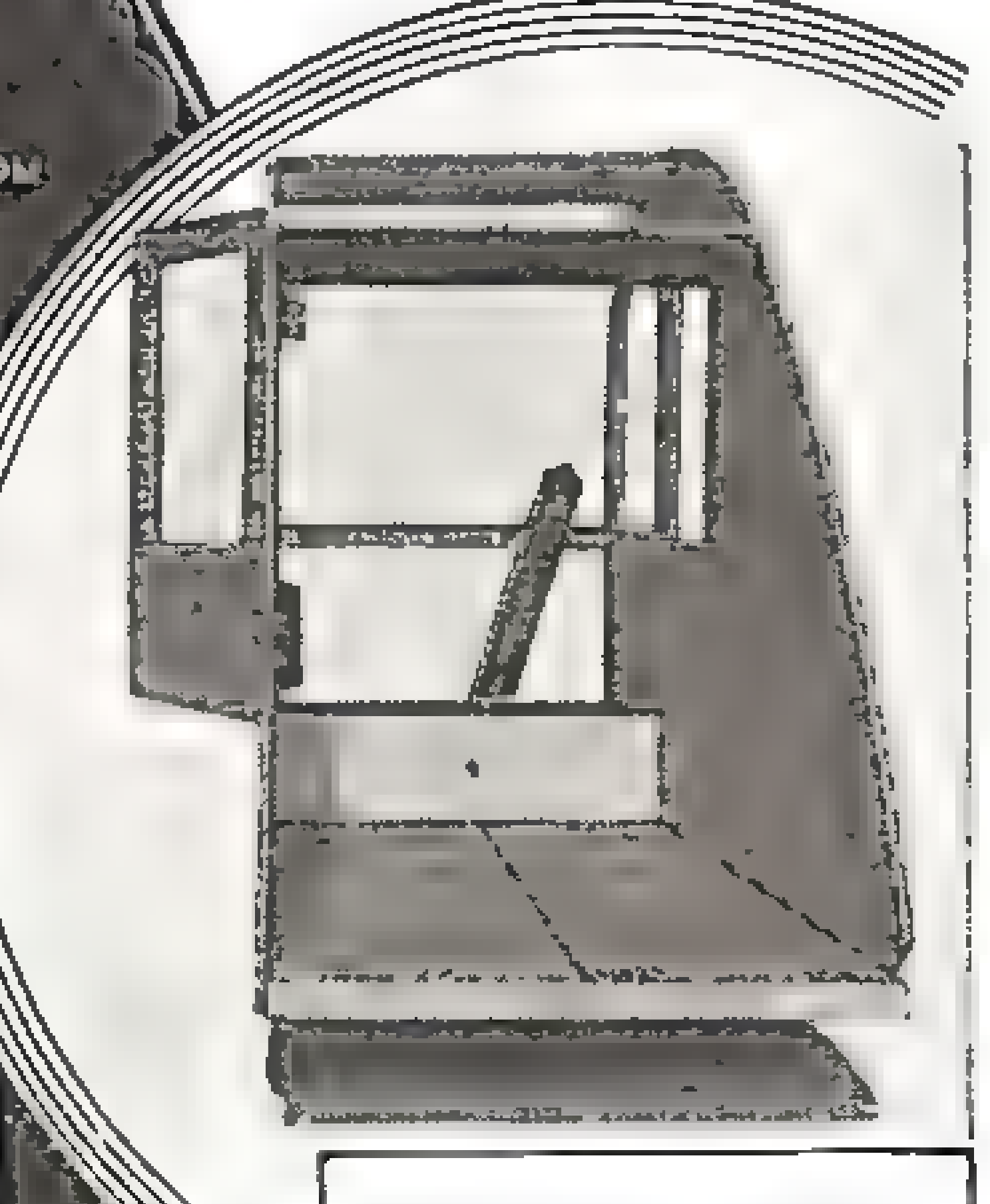

1/2 PLY MOUNTING BOARD OR SHEET METAL COVERING
FRONT WINDOW
PAINT CAR WHITE OR ALUMINUM THEN APPLY VARNISH
CUT BOARD AFTER IT IS TACKED ON
1"X2" CLEATS
JOYSTICK
END PIECE
1/2"X6" SHIPLAP BOTTOM
ADDITIONAL CLEAT FOR FOOT REST

Have youngster for whom scooter is built sit up against the plywood panel. Draw an outline for the streamlining which will allow him full head room when sitting.

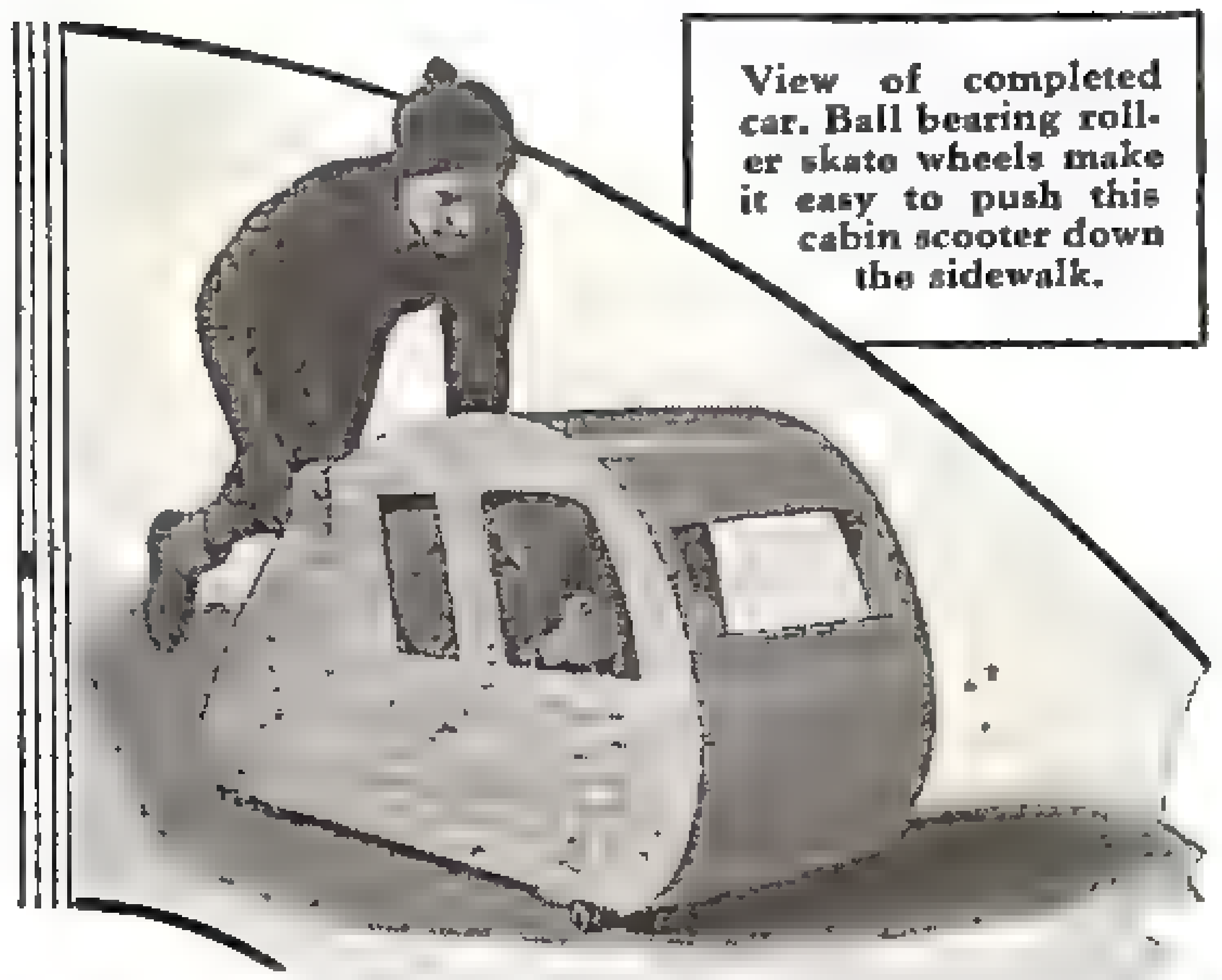

1" SQUARES
PATTERN OF WINDOW OPENINGS


3/4" FIR JOYSTICK
3/4" BRACES
1/4" BOLT FULCRUM
SLIDING BLOCK
1"
DRILL 3/16" HOLE IN TOE OF SKATE FOR PIVOT—USE HEAVY SCREWS

Both skates move parallel to each other for steering. Middle cleat, to which backs of skates are screwed, slides freely between front and back cleat. Lubricate the wood with laundry soap.



Back view showing platform just back of seat.



View of completed car. Ball bearing roller skate wheels make it easy to push this cabin scooter down the sidewalk.

SO GREAT is the appeal of this new variation of the old time roller skate coaster that youngsters will swarm out from everywhere to watch it, to push it, to ride in it.

Perhaps it is the snugness of the little cabin that appeals; perhaps it is the airplane type control which is the *piece de resistance* for everyone who has ever hankered to be a pilot; or perhaps it is that we are "tear-drop" conscious, because of auto manufacturer advertising. Anyway young and old alike stopped to watch when this streamlined cabin scooter was "put out on the road" for the first tests.

The cost of the scooter is negligible. Enough roller skates for the entire job can be purchased at a dime store for 40 cents. Any lumber yard will supply ¼" fir plywood for the sides, and the rest of the lumber is generally in the scrap heap.

Cut out the two side panels first, tacking them together lightly so they can both be sawed at the same time. Lay out streamlined design so there is no wasted space, but still sufficient head room and leg room for the biggest lad that will use the scooter.

After sawing out the two panels and cutting out door and windows as indicated on the plans, make the bottom of the coaster.

Match together enough boards for a platform 18" wide and 30" long—if you use shiplap and trim off the outer laps but two boards will be needed. Screw 1"x4" cleats across the bottom, using two at the front for the steering arrangement. When mounting the rear skates on the cleat, bend the heel portion of the skates in a vise to fit snugly around the cleat. Fasten the skates in place with screws.

The only complicated part of the entire construction is the airplane type steering control—and it isn't at all hard to make.

Drill 3/16" holes in the toes of the two front skates, to serve as pivot holes.

Cut out a hole in the sliding cleat for the end of the steering lever. Put heavy screws through the adjusting slots of the skates into the middle cleat, lining up the skates first. Mount the joystick between two braces, using a quarter inch bolt for a pivot, and the steering joystick is completed.

Next set in the seat, slanting it at a comfortable angle. Nail on the sides with 7 penny box nails, being sure they are parallel. Use 1"x2" spacers along the top.

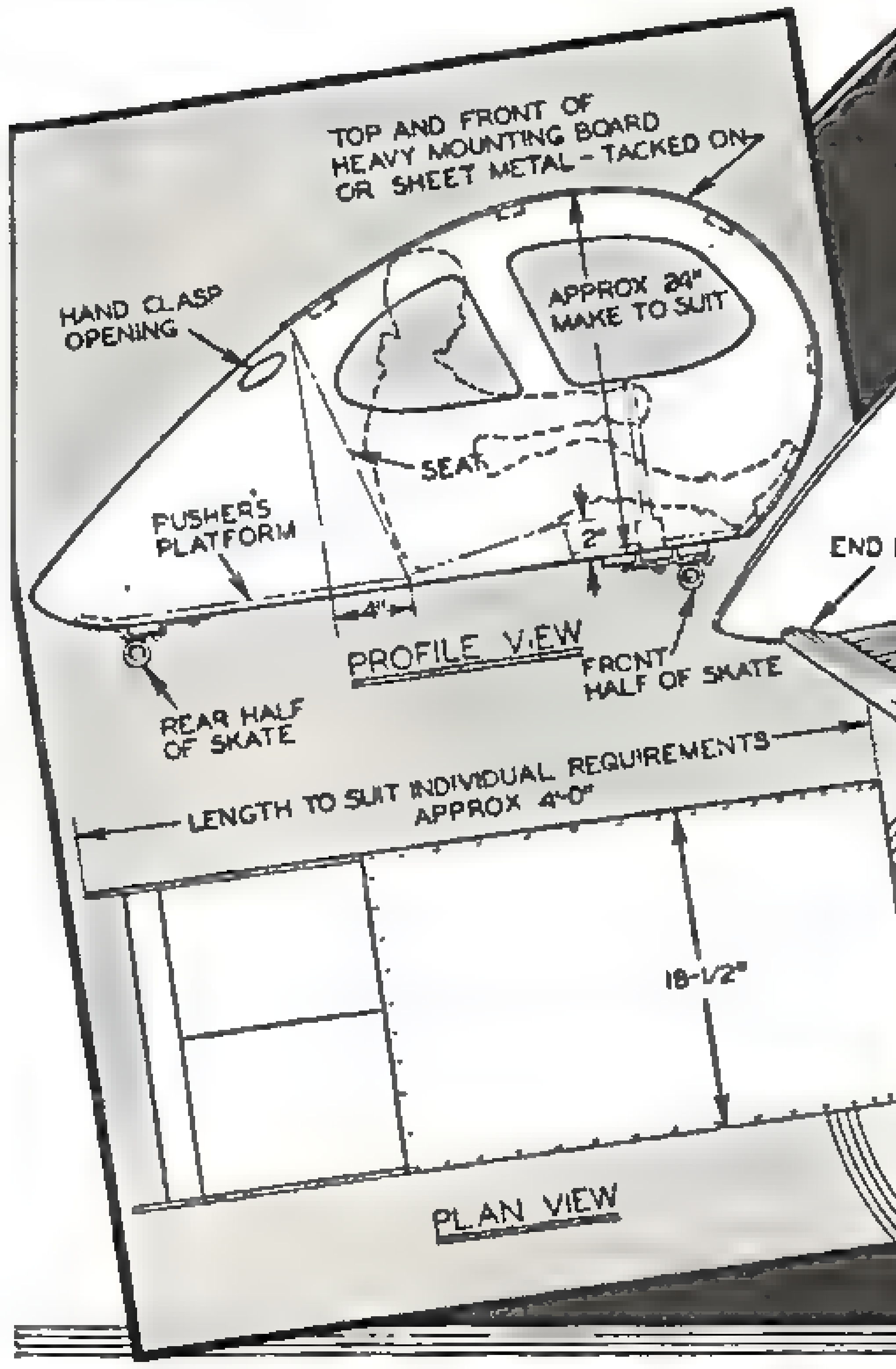
The covering can be of heavy cardboard or tin 24"x36" in size. Use ½" large head brads or tacks, not the pointed carpet tacks.

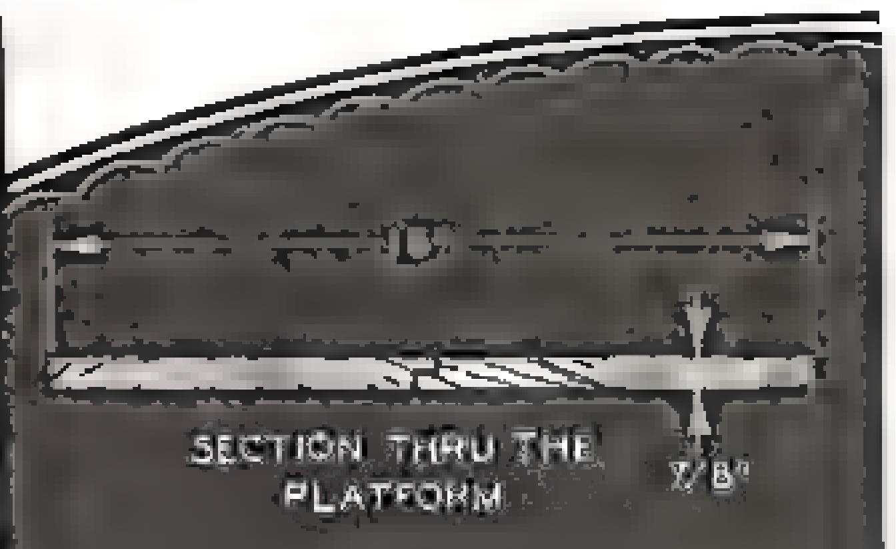
The car is then ready for painting. White makes the best color, but any other color scheme may be used to suit the fancy.

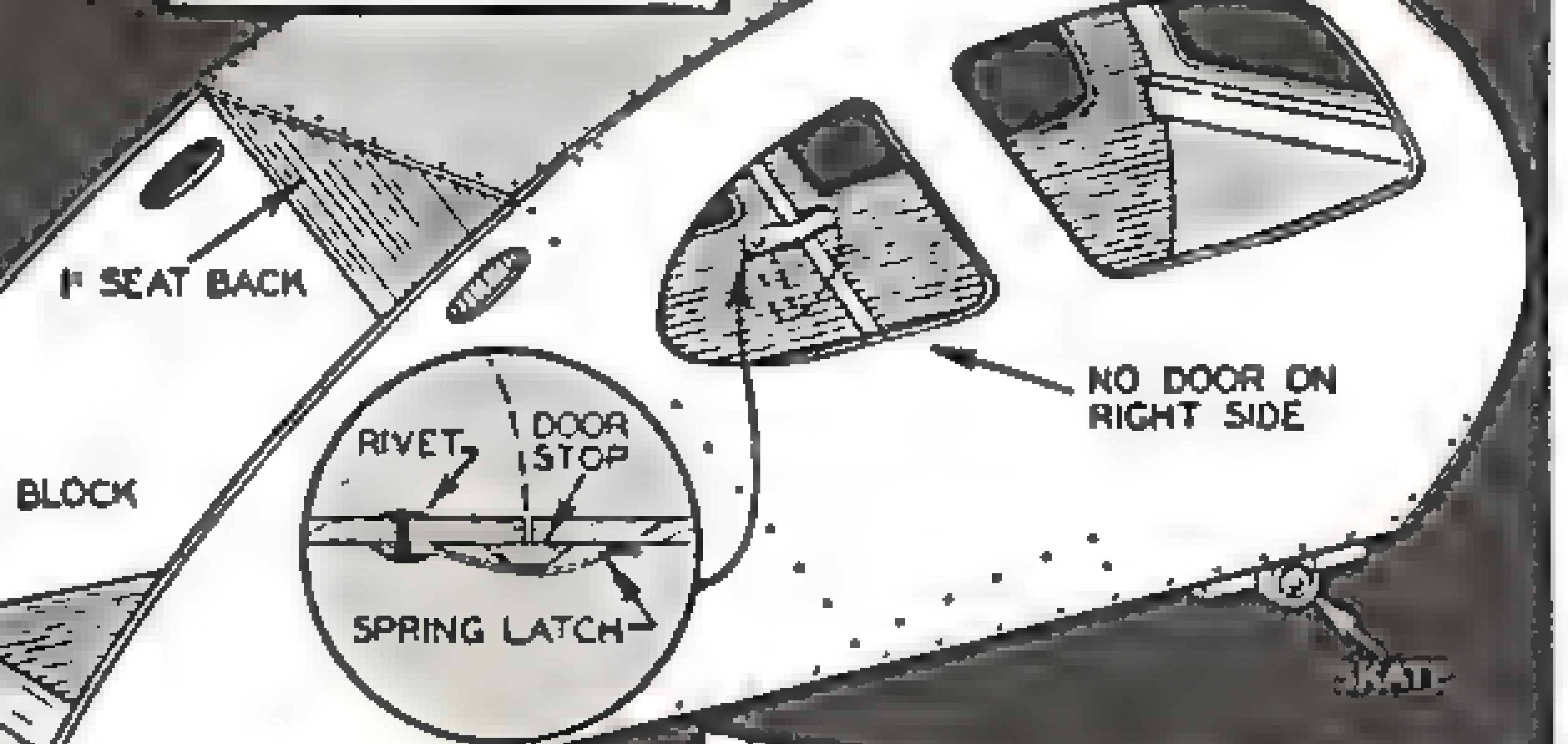
With friends taking turns pushing and riding, the lad for whom this coaster is built will be the envy of the neighborhood.

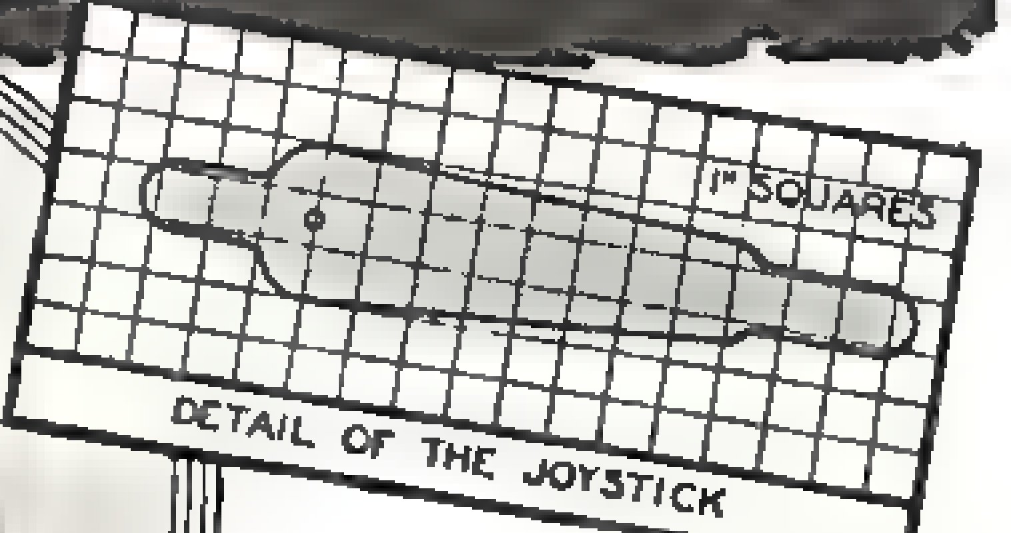
PHOTO SHOWING MOUNTING OF REAR SKATE WHEELS

Rear skate wheels are screwed to scooter at two points. Below: Use ¼" fir plywood for side panels, sawing out both at same time with compass saw or bandsaw. Fasten hinges in position before sawing out door, for accuracy.


TOP AND FRONT OF HEAVY MOUNTING BOARD OR SHEET METAL - TACKED ON
HAND CLASP OPENING
APPROX 24" MAKE TO SUIT
SEAT
PUSHER'S PLATFORM
2"
4"
PROFILE VIEW
REAR HALF OF SKATE
FRONT HALF OF SKATE
LENGTH TO SUIT INDIVIDUAL REQUIREMENTS APPROX 4'-0"
18-1/2"
PLAN VIEW


SECTION THRU THE PLATFORM
7/8"

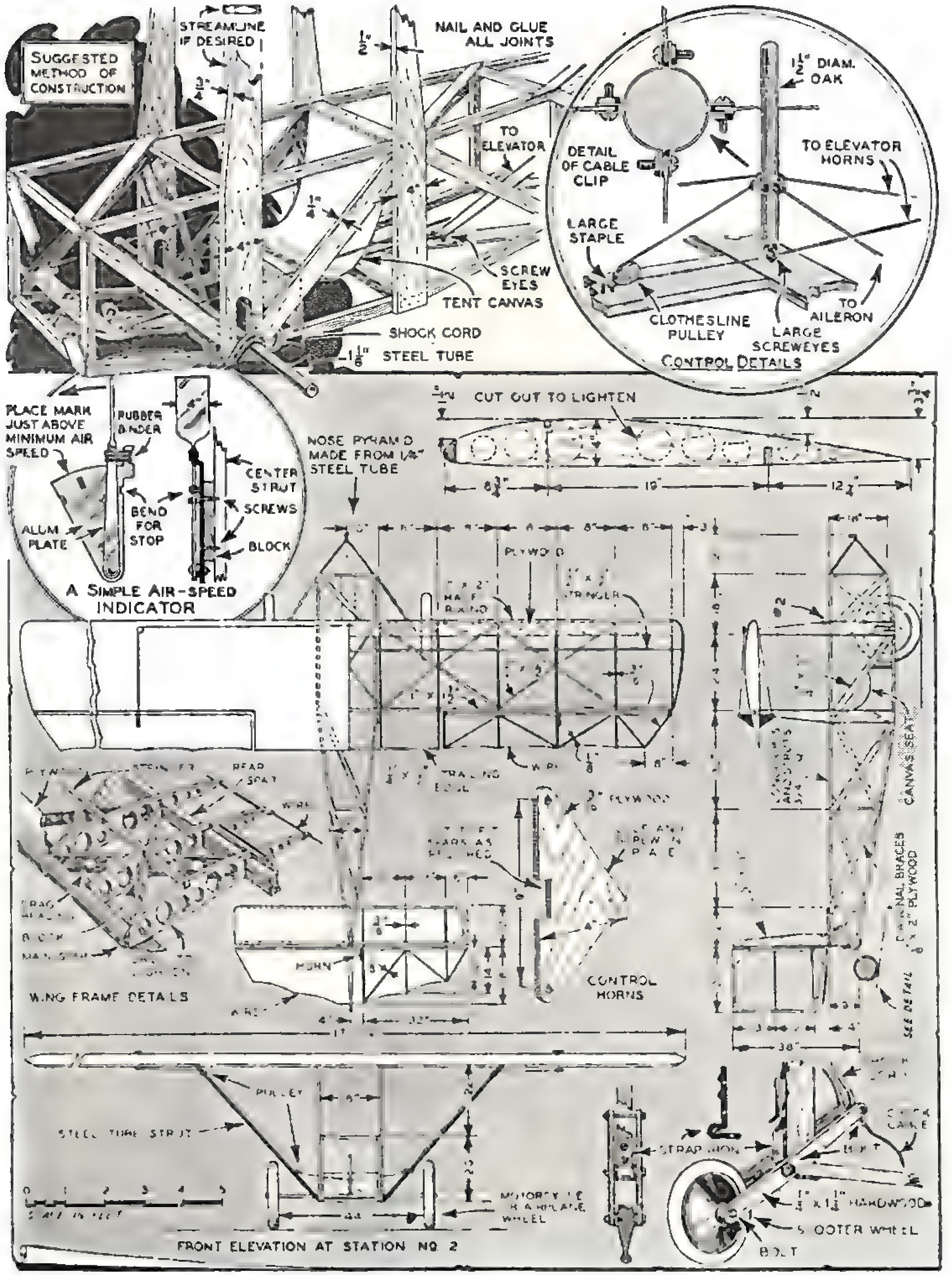

1/4" FIR PLYWOOD SIDES
1" SEAT BACK
END BLOCK
RIVET
DOOR STOP
SPRING LATCH
NO DOOR ON RIGHT SIDE
SKATE


1" SQUARES
DETAIL OF THE JOYSTICK

Left: Bottom view showing steering arrangement. Above: Spring door latch is riveted to door; door stop is nailed to inside of side panel. Cut joystick out of ¾-inch fir.

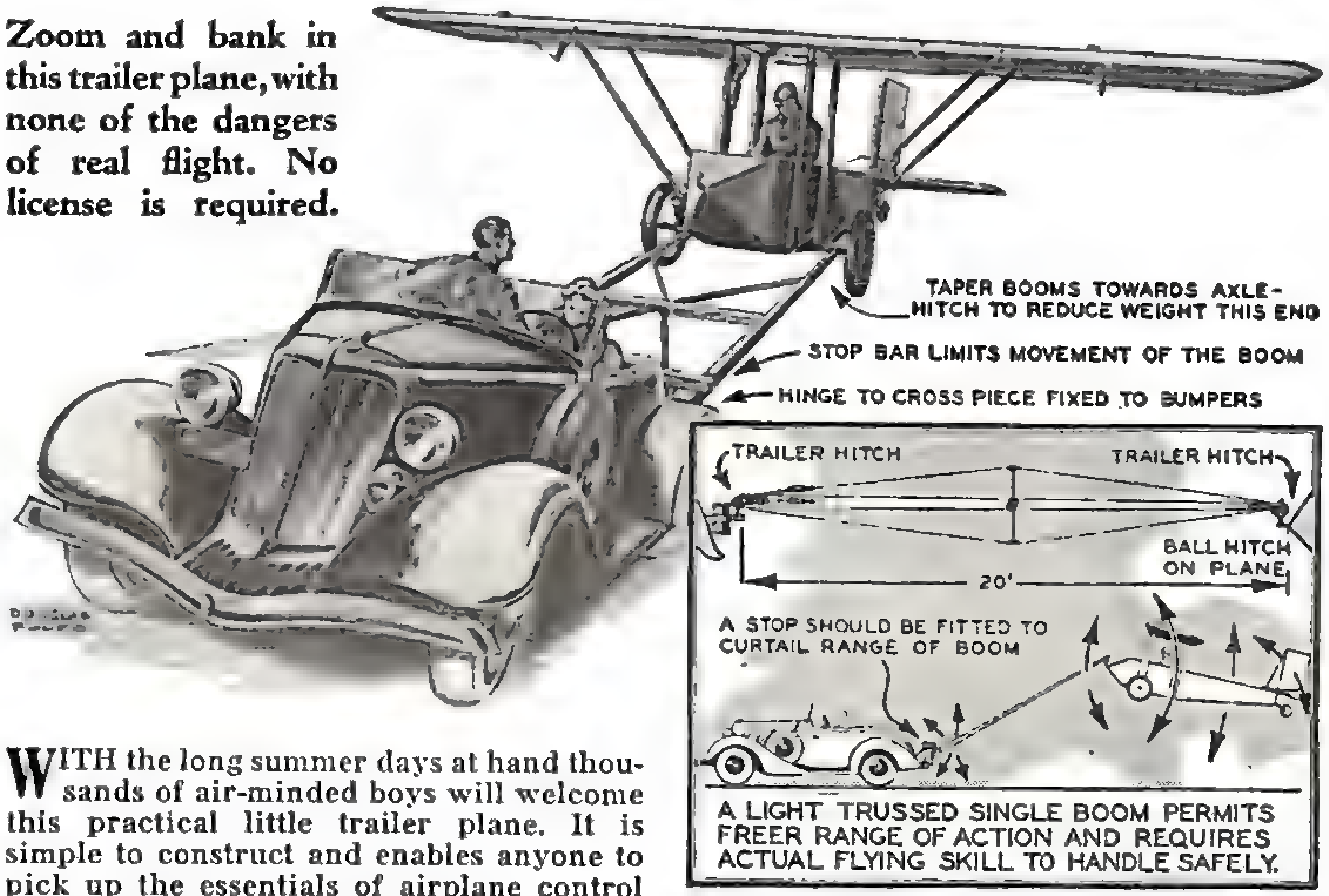
Real Flying Thrills Are Yours With this Captive Plane

by DOUGLAS ROLFE


SUGGESTED METHOD OF CONSTRUCTION
STREAMLINE IF DESIRED
NAIL AND GLUE ALL JOINTS
1/2"
3/4"
1/4"
TO ELEVATOR
SCREW EYES
TENT CANVAS
SHOCK CORD
1 1/8" STEEL TUBE
DETAIL OF CABLE CLIP
1 1/2" DIAM. OAK
TO ELEVATOR HORNS
LARGE STAPLE
CLOTHESLINE PULLEY
LARGE SCREWEYES
TO AILERON
CONTROL DETAILS
PLACE MARK JUST ABOVE MINIMUM AIR SPEED
RUBBER BINDER
BEND FOR STOP
ALUM PLATE
CENTER STRUT
SCREWS
BLOCK
A SIMPLE AIR-SPEED INDICATOR
NOSE PYRAMID MADE FROM 1/4" STEEL TUBE
CUT OUT TO LIGHTEN
6 3/4"
19"
12 1/2"
PLYWOOD
STRINGER
TRAILING EDGE
WIRE
8"
WING FRAME DETAILS
REAR SPAR
DRAG BRACES
MAIN SPAR
3/16" PLYWOOD
CONTROL HORNS
HORN
4"
32"
CANVAS SEAT
DIAGONAL BRACES 1/8" x 2" PLYWOOD
SEE DETAIL
38"
PULLEY
STEEL TUBE STRUT
MOTORCYCLE OR AIRPLANE WHEEL
44
0 1 2 3 4 5
SCALE IN FEET
FRONT ELEVATION AT STATION NO. 2
STRAP IRON
SHOCK CABLE
BOLT
1" x 1 1/4" HARDWOOD
SCOOTER WHEEL

Constructional details for trailer plane are shown above. Straight-grained spruce should be used for all important members, and any light, straight-grained wood for other parts. Strips of inner tube may be used in place of shock cord to cushion landings. Airspeed indicator shown above will prevent crashes. It may be calibrated against speedometer of car. Strong disc wheels with rubber tires are necessary if towing plane considerable distance on the ground.

Zoom and bank in this trailer plane, with none of the dangers of real flight. No license is required.


DOUGLAS ROLFE
TAPER BOOMS TOWARDS AXLE-HITCH TO REDUCE WEIGHT THIS END
STOP BAR LIMITS MOVEMENT OF THE BOOM
HINGE TO CROSS PIECE FIXED TO BUMPERS
TRAILER HITCH
TRAILER HITCH
BALL HITCH ON PLANE
20'
A STOP SHOULD BE FITTED TO CURTAIL RANGE OF BOOM

A LIGHT TRUSSED SINGLE BOOM PERMITS FREER RANGE OF ACTION AND REQUIRES ACTUAL FLYING SKILL TO HANDLE SAFELY.

No special knowledge of aviation is needed to build or fly captive plane, nor is license required. Auto is power unit.

WITH the long summer days at hand thousands of air-minded boys will welcome this practical little trailer plane. It is simple to construct and enables anyone to pick up the essentials of airplane control with a minimum of risk and cost.

Being entirely dependent upon a tow car, to which it is securely attached at all times during operation, and being definitely limited to a prescribed area of actual manipulation, the dangers ordinarily connected with preliminary flight instruction are completely eliminated.

Furthermore the plane itself does not have to be stressed to any particularly high standard of structural safety (though common sense dictates sturdy and careful construction). The plans on the opposite page provide a method of construction which is unique in its simplicity and strength. They are more than adequate for the purpose intended.

As will be seen from a glance at the diagrams, either of two hitches may be employed. In practice it will probably be found that *both* are needed: The double-boom hitch limits movements of the trailer to simple up and down flight and is recommended for the rank novice who has yet to master the intricacies of lateral control. Advanced "students" will revel in the freedom of movement which the single-boom flexible-joint hitch permits. Lateral control and even banked turns are possible with this hook-up.

As the plane is at all times within easy speaking distance of the tow car, instruction can be given during "flight" and errors of control pointed out immediately they become apparent.

Any sudden decrease of speed by the tow car should be avoided while the trailer is aloft. A good plan is to have a second man in the car ready to signal any intention to slow down or stop. This will give the student ample time to put the nose down and "land."

Better still, a simple air speed indicator can be made as shown in the drawings and the student coached to set the ship down the moment the pointer passes the mark indicating danger. This mark should be predetermined in actual tests to ascertain the exact speed required to maintain flight.

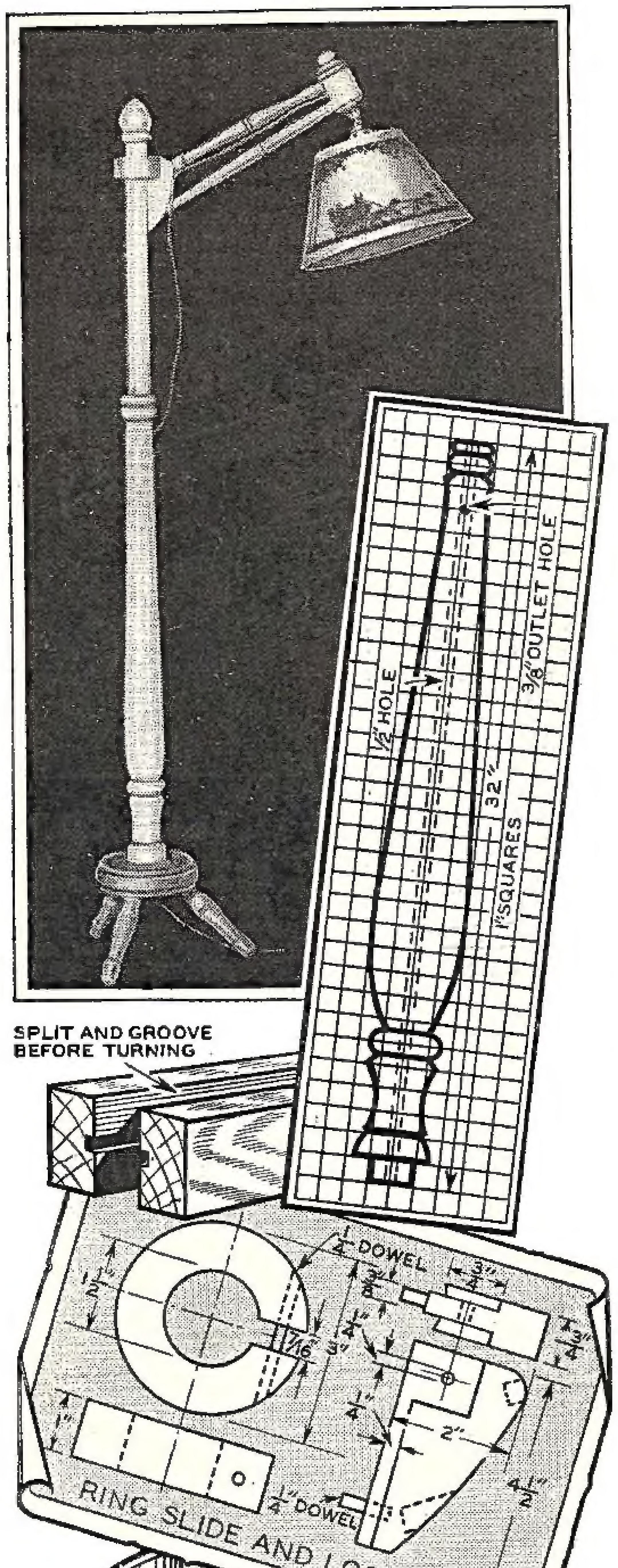
This training plane is designed to operate at speeds *not to exceed 30 miles an hour.* Unless a stronger and altogether more ambitious type of plane is used this rule must be rigidly observed. As a matter of fact it may be said that no more speed is necessary than slightly over the bare amount required to keep the trainer in the air. Play safe and thus avoid trouble.

The actual method of construction is covered in the plans. It will be seen that the

(Continued on page 126)

A COLONIAL Bridge Lamp
with Adjustable Shade Support

by O. E. OLSON



THERE are very few of us who do not appreciate the beauty of colonial furniture, especially where design and use are in harmony with present conventions. In the simple and graceful lines of this lamp some of the spirit of Early America is recaptured. The soft and mellow tone of hard maple lends the final touch keeping it distinctly colonial.

Select clear seasoned hard maple from 3"x3"x33" stock to make the lamp post. Split the stock and saw a ½"x¼" groove down the center of each piece. Glue these pieces together in their original position and clamp well. This method of making the hole for the light cord is much more accurate than boring, and saves a great deal of time.

Use Linseed Oil Finish

When the glue is thoroughly dry set the stock in a large wood-turning lathe and turn to shape. Sand, finish and polish the work before removing it from the lathe. The type of finish may be either French polish or linseed oil with rubbed wax.

The lamp support is made to slide freely up or down, locking in place at any desired height. Turn the upper post or slide to a scant 1½" in diameter. Cut the ring lock channel on the circle saw. If this machine is not available cut as you would in making a mortise. Bore the ¼" lock holes 1" apart taking care that they are in the middle of the channel. Bore ½" dowel holes in both ends of the post.

In making the ring and lock follow all specifications closely to insure an easily adjusted and well fitting lock. When the lamp arms are raised the ring should slide freely with a minimum of play. A slight rounding of some of the inside corners may be necessary to give smooth action.

The arms are turned from 1"x1" stock to an end dimension of ½". The lower arm is somewhat longer and more difficult to place due to the necessity of boring holes at an angle in the lock piece. Determine carefully the angle needed before boring.

Turn the decorative top for the post and the lamp socket block from one piece and separate with the parting tool. Bore holes as shown in the diagrams, using a ⅜" bit for all wire outlet holes.

The top of the cricket stool, which forms the base of the lamp, is turned from 1½" stock. Cut the center post hole on the lathe to a snug fit with lamp post, thereby insuring a perfectly vertical post assembly.

Cut a template or turning pattern for the legs out of heavy cardboard. Turn three legs out of 2"x2" stock. Draw them up well to the template for uniformity. Locate and mark positions for the leg holes in the stool top, the legs being equal distances apart. This is simply done by constructing an equilateral triangle on the stool base, each corner thus marking a hole.

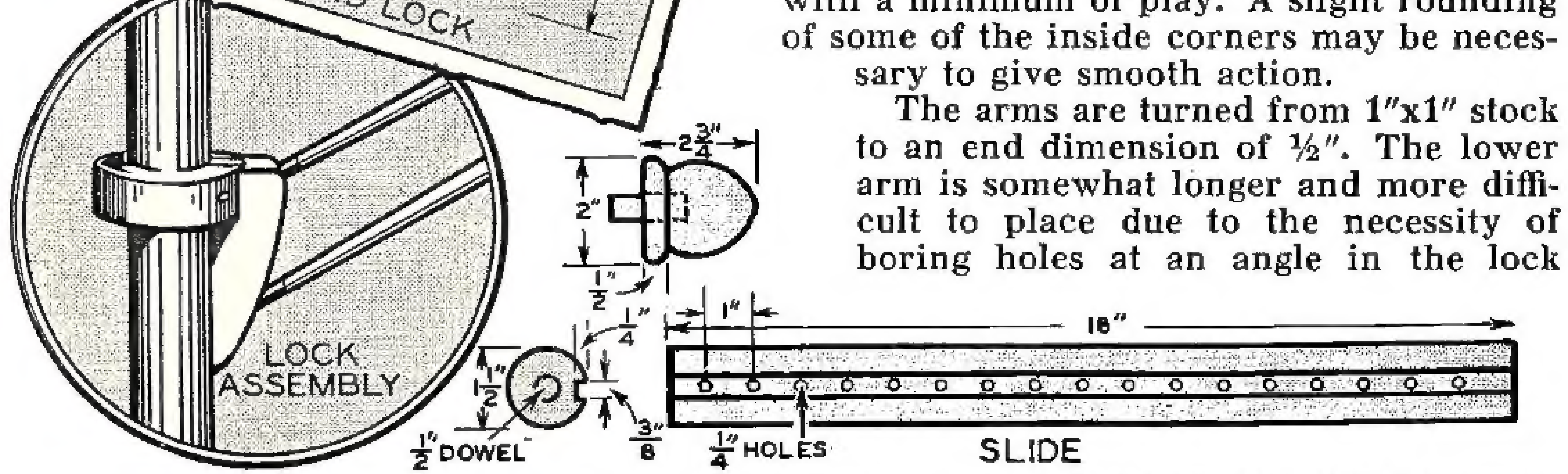
Drilling the Leg Holes

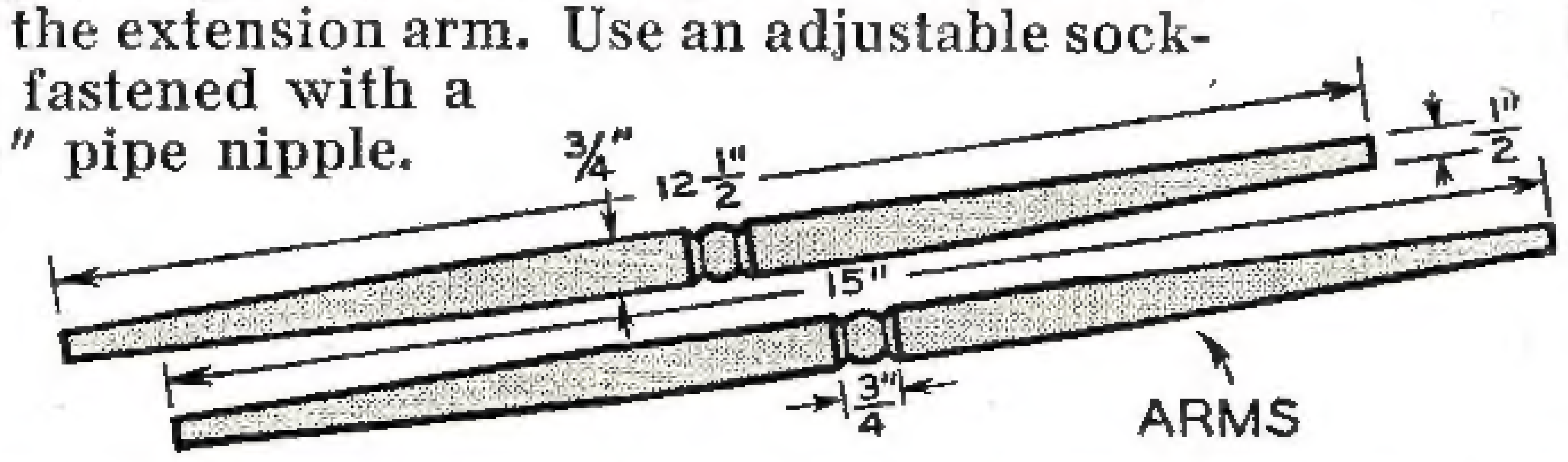
It is very difficult to bore all leg holes at a uniform angle without a drill press. If such a machine is not available it can be done by making a boring jig from 2" scrap wood stock. Bore a ¾" hole at an angle of forty degrees in this stock. Clamp the guide securely to the cricket stool top over the leg hole position. The hole in the scrap stock will guide the drill for the leg hole. Bore all of the leg holes in this manner. Glue in the legs securely and test for levelness.

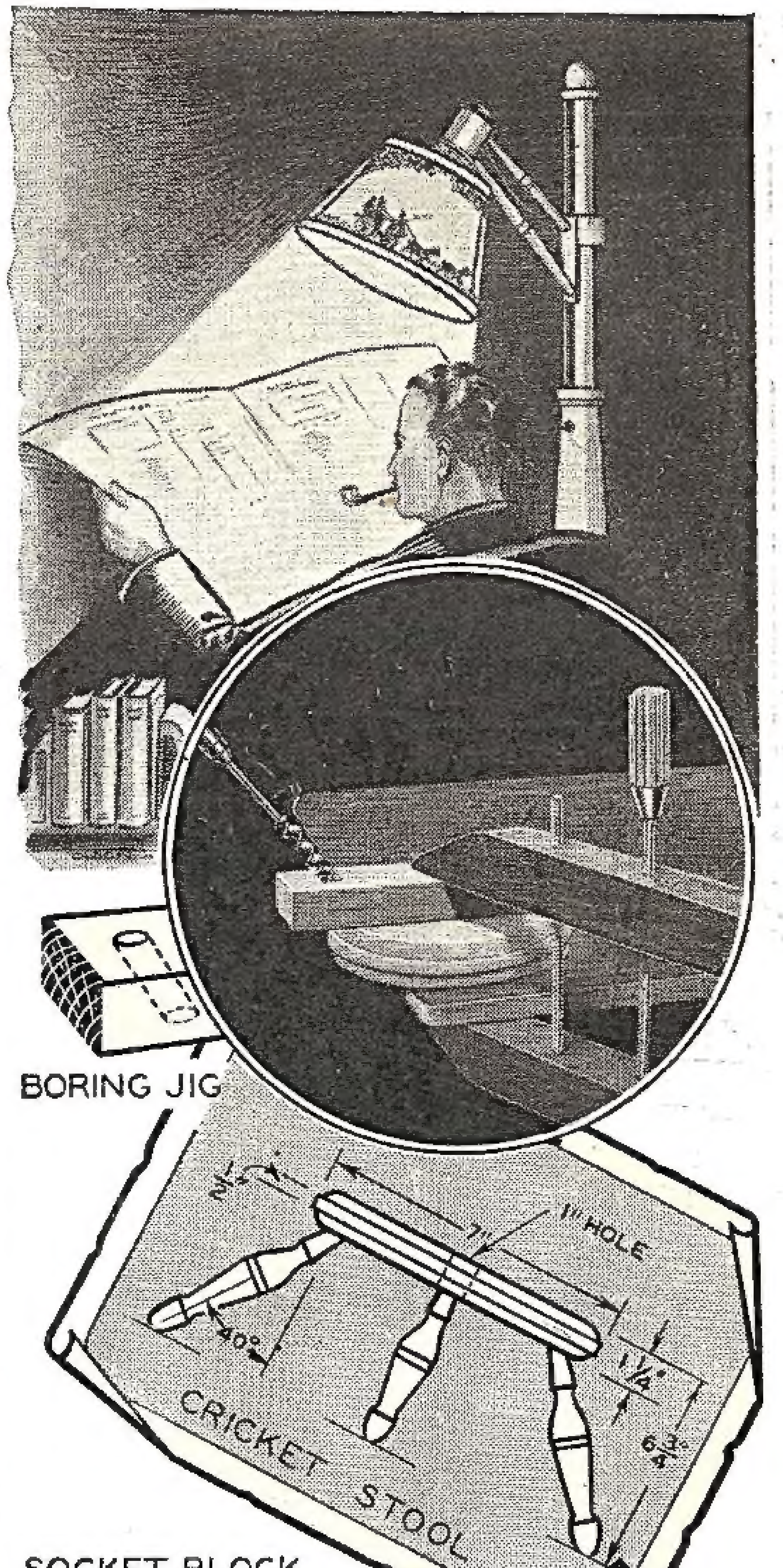
In assembling the lamp glue the dowel pins in place and draw all unions tight. Care must be taken that the lamp stands vertical and in such a position that the extension arm is directly above one of the legs.

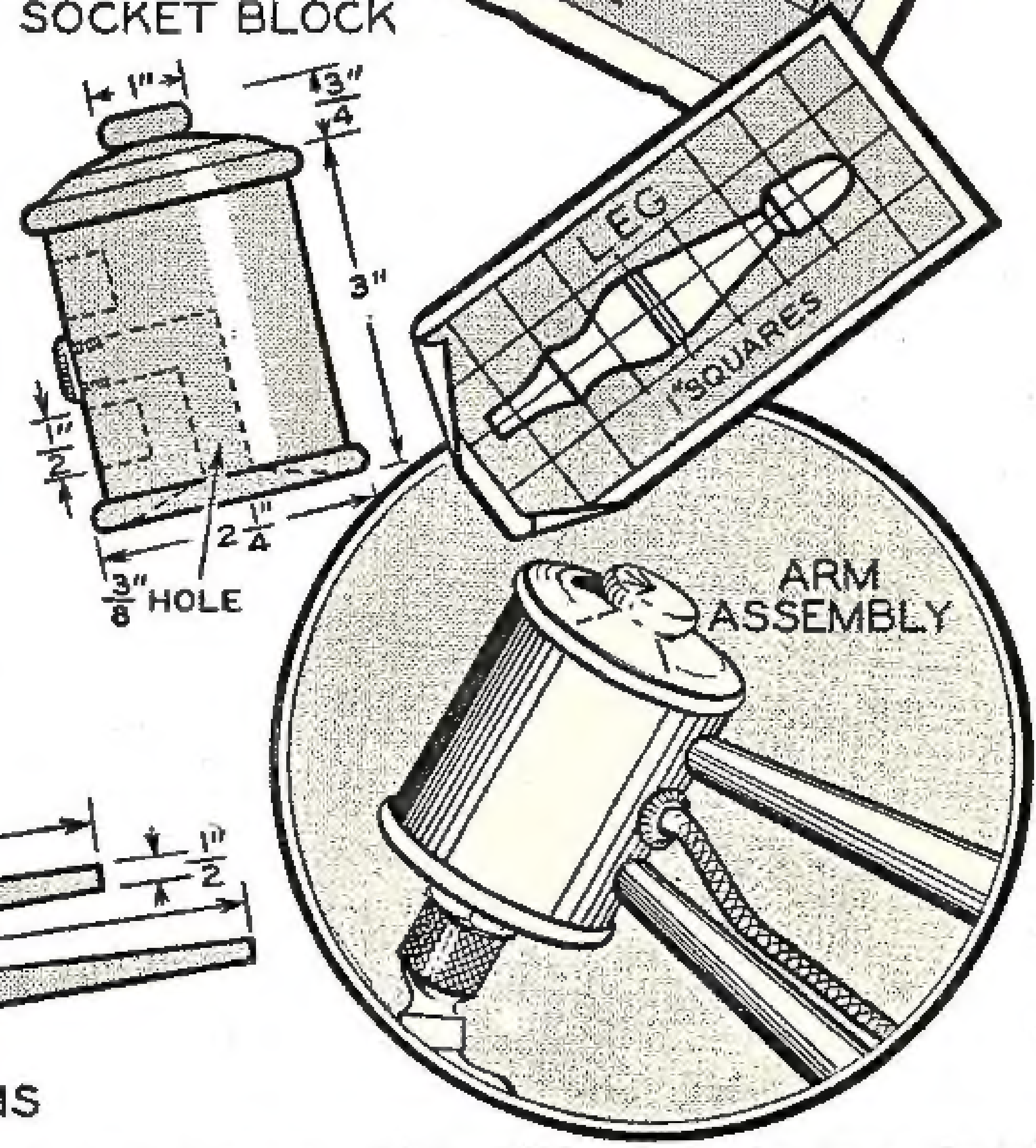
Let the lamp stand for twenty-four hours, or until the glue is thoroughly dry. Then screw ⅜" insulated bushings into the wire outlet holes in the bottom of the post and in the lamp fixture block.

To simplify the task of wire threading pass a fine flexible wire or strong string through the post, then draw light cord through with it. Do likewise with the socket block, allowing enough free wire to permit adjustment of the extension arm. Use an adjustable socket fastened with a ⅜" pipe nipple.





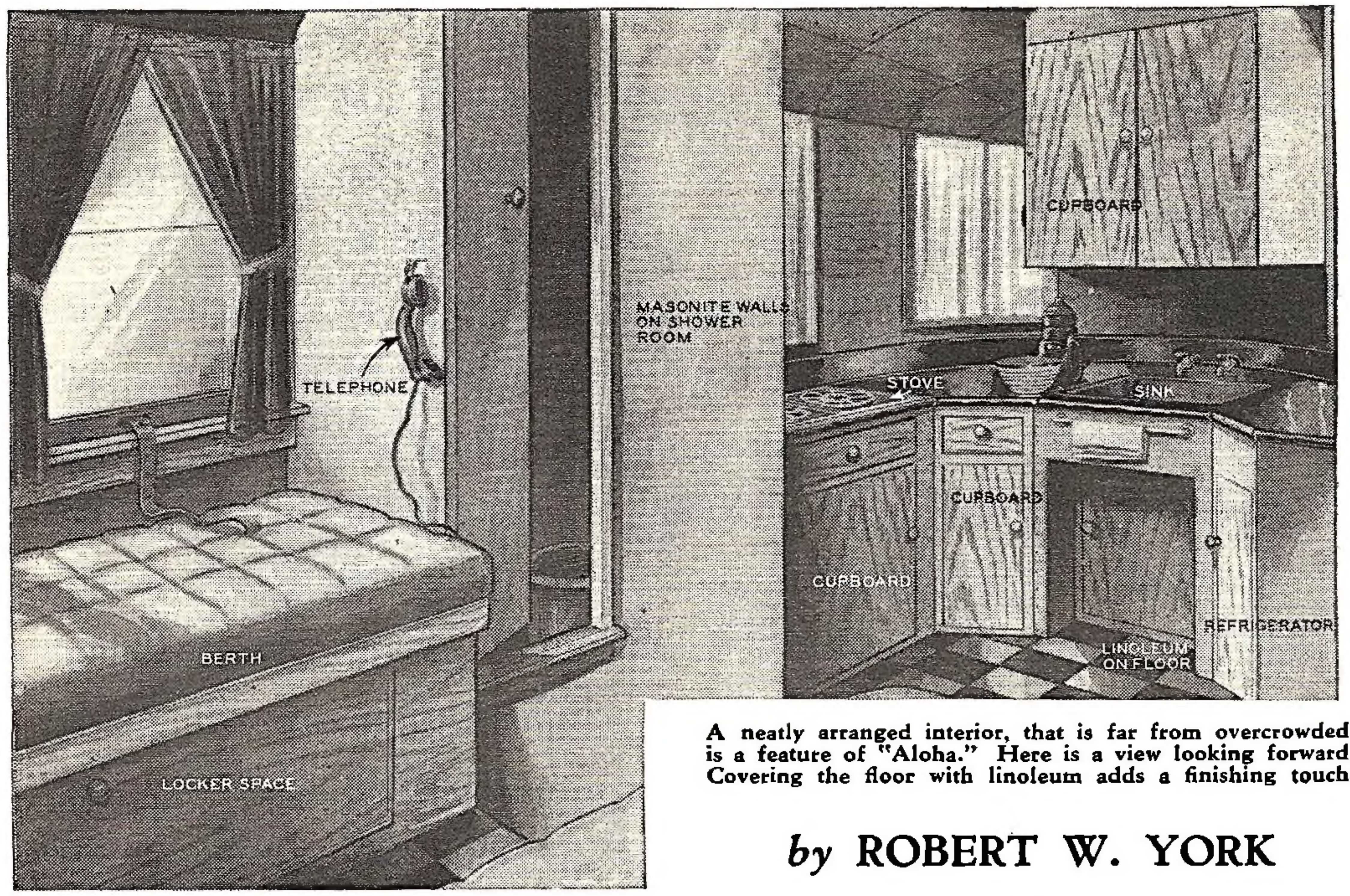




Completed bridge lamp shown at upper left. Lamp support arms are fastened to lock assembly which slides up and down on center post, locking in place at any desired height. Any kind of parchment or silk shade may be used on lamp.

Circular inset above shows method of clamping boring jig to base of lamp, to aid in drilling holes for legs. Socket block is bored as indicated for arms and for lamp cord. Standard pull chain socket is fastened to socket block.

BUILDING the BODY of "ALOHA"—Trailer de Luxe


CUPBOARD
MASONITE WALLS ON SHOWER ROOM
TELEPHONE
STOVE
SINK
CUPBOARD
CUPBOARD
BERTH
LOCKER SPACE
LINOLEUM ON FLOOR
REFRIGERATOR

A neatly arranged interior, that is far from overcrowded, is a feature of "Aloha." Here is a view looking forward. Covering the floor with linoleum adds a finishing touch.

by ROBERT W. YORK

PART II

FITTED with a shower, telephone, berths, kitchen and plenty of storage space, "Aloha" without a doubt is the "trailer de luxe" for summer touring. Yet the body construction is no more difficult than the average trailer.

The body is built after the chassis is completed according to instructions covered in Part I in the July issue. Check the chassis to be certain it is square and plumb. The wheel alignment must be true and at right angles to the line of pull, which will be the chassis centerline.

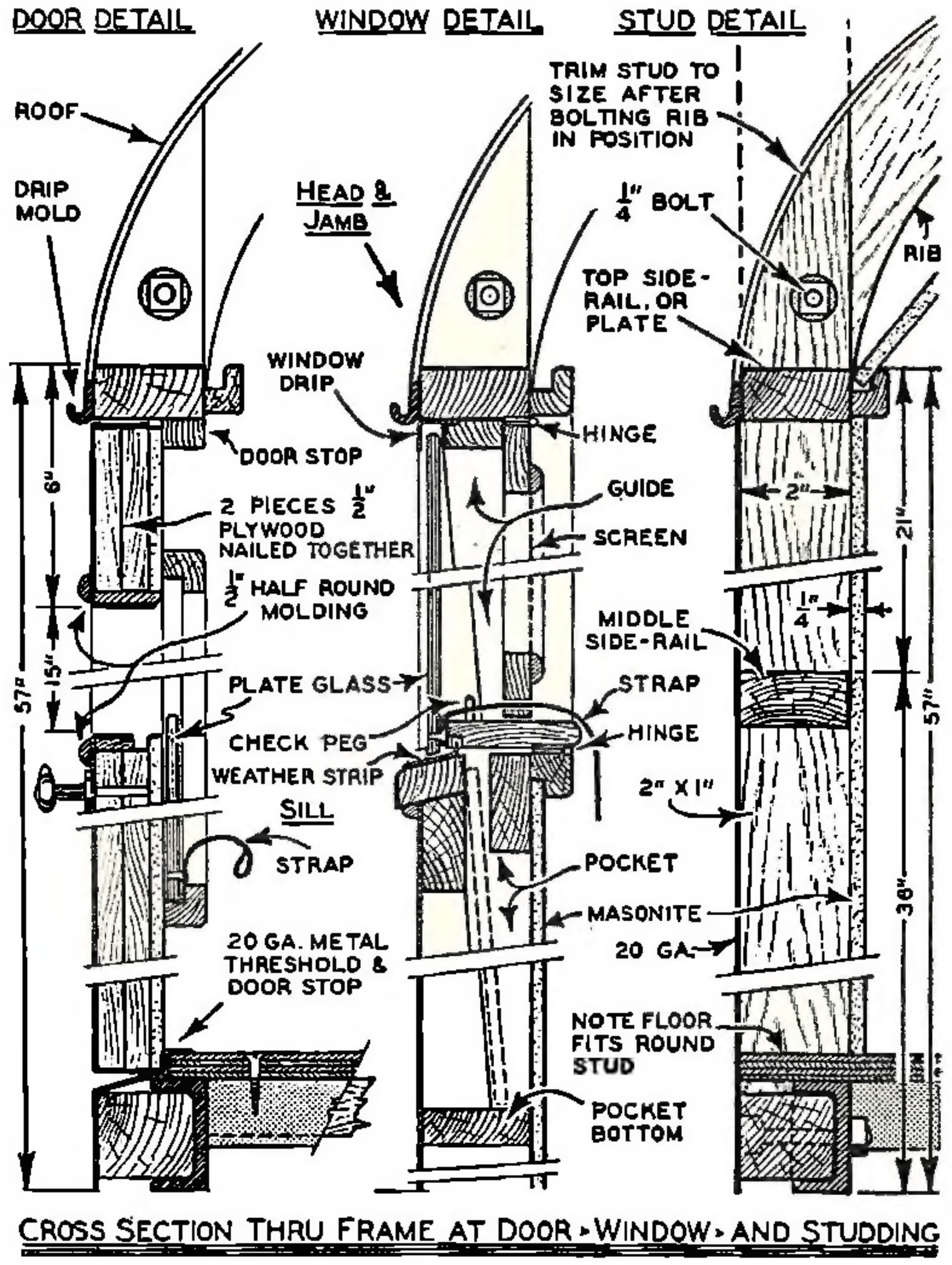
Then you are ready to proceed with building up the body. Here a band saw would come in handy but if you haven't one you will be in no worse position than the writer. It will be noted in the chassis drawings, given in Part I, that the flanges of the channel iron face outward. This is in order that a wood member 1½x1¾ may fit snugly in the channel. This sill may be placed in two ways, either by steaming and bending to shape (see March, 1934, issue of Modern Mechanix and Inventions, page 109), or cutting in the required curve. In either case this wood sill is bolted to the channel iron using ¼" stove bolts placed at 2' centers.

Next cut the required number of frame studs. The finished sizes should be 1"x2"x5'-6". At the dimensions shown on the plans ¾x¾x2" cleats are nailed on both faces of the studs to hold the side rail strips and plates. Notch out one end of each stud and the sill where the studs occur to form a snug mortise joint, and bolt the studs to the sill with ¼" stove bolts as shown in Part I. Be sure that the outer faces of the studs are flush with the outer face of the sill. Nailing strips are now to be placed where the lower set of cleats occur. To get the correct curves for these members lay the raw material on the sill between their respective studs and mark the outer curve of the sill at the same time keeping the inner edges in a straight line. Establish the respective angles at the ends for nailing to the studs to form a neat joint. This nailing strip need not be more than ¾" thick and occurs only where disappearing windows *are not* used. A study of the details will explain existing conditions there.

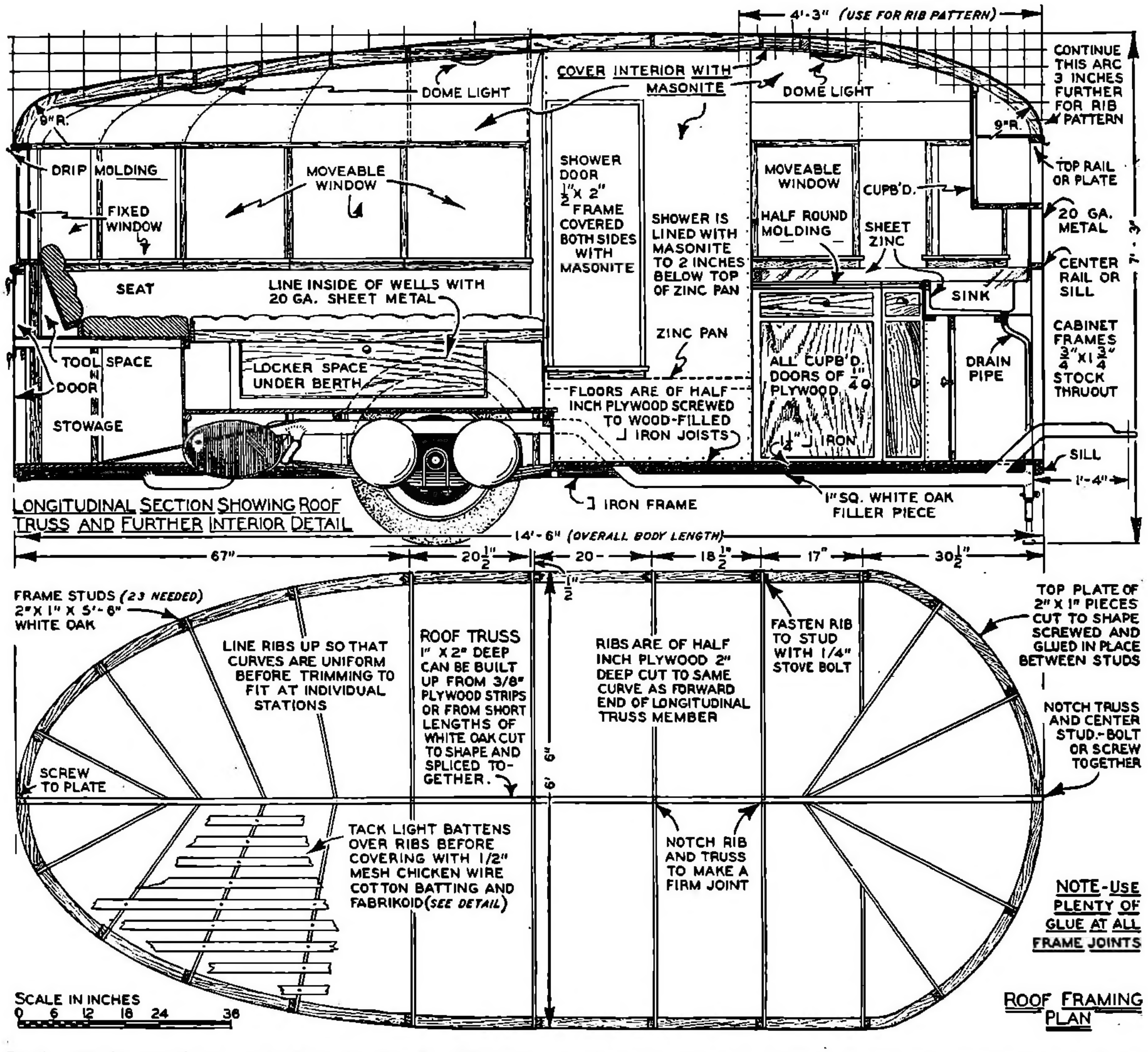
The top side rail or plate members are cut and fitted in a similar manner but inch stock is recommended here. Assuming that all the plate and nailing members are cut, take a pot of water-proof glue and use freely. Then nail the rails in place against the cleats using a fair size finishing nail. Temporarily brace the work so that it does not get out of square or plumb while the glue is drying.

The roof is the next step and we begin by cutting the longitudinal truss member, the piece that runs from front to rear of the roof. Reference to the drawings will dis-

(Continued on page 122)


DOOR DETAIL
WINDOW DETAIL
STUD DETAIL
ROOF
DRIP MOLD
HEAD & JAMB
TRIM STUD TO SIZE AFTER BOLTING RIB IN POSITION
1/4" BOLT
TOP SIDE-RAIL, OR PLATE
RIB
WINDOW DRIP
DOOR STOP
HINGE
2 PIECES 1/2" PLYWOOD NAILED TOGETHER
GUIDE
SCREEN
1/2" HALF ROUND MOLDING
MIDDLE SIDE-RAIL
PLATE GLASS
STRAP
CHECK PEG
WEATHER STRIP
HINGE
SILL
2" X 1"
STRAP
POCKET
MASONITE
20 GA.
20 GA. METAL THRESHOLD & DOOR STOP
NOTE FLOOR FITS ROUND STUD
POCKET BOTTOM
6"
15"
57"
21"
2"
1/4"
57"
36"
CROSS SECTION THRU FRAME AT DOOR-WINDOW-AND STUDDING

Details of windows and door illustrate construction recommended. Flooring is laid to extreme edge of chassis sill frame except at door, as shown, and at wheel wells. Note that window stool and screen frame are hinged to permit window to be lowered. Auto door lock is best for door.


4'-3" (USE FOR RIB PATTERN)
CONTINUE THIS ARC 3 INCHES FURTHER FOR RIB PATTERN
COVER INTERIOR WITH MASONITE
DOME LIGHT
DOME LIGHT
9"R.
9"R.
DRIP MOLDING
FIXED WINDOW
MOVEABLE WINDOW
SHOWER DOOR 1/2" X 2" FRAME COVERED BOTH SIDES WITH MASONITE
SHOWER IS LINED WITH MASONITE TO 2 INCHES BELOW TOP OF ZINC PAN
MOVEABLE WINDOW
HALF ROUND MOLDING
CUPB'D.
SHEET ZINC
TOP RAIL OR PLATE
20 GA. METAL
CENTER RAIL OR SILL
SEAT
LINE INSIDE OF WELLS WITH 20 GA. SHEET METAL
ZINC PAN
SINK
CABINET FRAMES 3/4" X 1 3/4" STOCK THRUOUT
TOOL SPACE
DOOR
STOWAGE
LOCKER SPACE UNDER BERTH
FLOORS ARE OF HALF INCH PLYWOOD SCREWED TO WOOD-FILLED IRON JOISTS
ALL CUPB'D. DOORS OF 1/4" PLYWOOD
DRAIN PIPE
1/4" IRON
SILL
1'-4"
7'-3"
IRON FRAME
1"SQ. WHITE OAK FILLER PIECE
LONGITUDINAL SECTION SHOWING ROOF TRUSS AND FURTHER INTERIOR DETAIL
14'-6" (OVERALL BODY LENGTH)
67"
20 1/2"
20
18 1/2"
17"
30 1/2"
FRAME STUDS (23 NEEDED) 2" X 1" X 5'-6" WHITE OAK
LINE RIBS UP SO THAT CURVES ARE UNIFORM BEFORE TRIMMING TO FIT AT INDIVIDUAL STATIONS
ROOF TRUSS 1" X 2" DEEP CAN BE BUILT UP FROM 3/8" PLYWOOD STRIPS OR FROM SHORT LENGTHS OF WHITE OAK CUT TO SHAPE AND SPLICED TOGETHER.
RIBS ARE OF HALF INCH PLYWOOD 2" DEEP CUT TO SAME CURVE AS FORWARD END OF LONGITUDINAL TRUSS MEMBER
FASTEN RIB TO STUD WITH 1/4" STOVE BOLT
TOP PLATE OF 2" X 1" PIECES CUT TO SHAPE SCREWED AND GLUED IN PLACE BETWEEN STUDS
NOTCH TRUSS AND CENTER STUD-BOLT OR SCREW TOGETHER
SCREW TO PLATE
6'-6"
TACK LIGHT BATTENS OVER RIBS BEFORE COVERING WITH 1/2" MESH CHICKEN WIRE COTTON BATTING AND FABRIKOID (SEE DETAIL)
NOTCH RIB AND TRUSS TO MAKE A FIRM JOINT
NOTE-USE PLENTY OF GLUE AT ALL FRAME JOINTS
SCALE IN INCHES
0 6 12 18 24 36
ROOF FRAMING PLAN

Studs, 23 in number, are bolted to chassis sill frame as shown in Part I. Front center stud, attached last, is not fastened to sill but to center rail because of trailer hitch. The pattern for the lengthwise truss of the roof is also used for laying out ribs. Tire pump develops air pressure in tanks under body to force water to the shower and sink.

FOR INVENTORS And Mechanical Minded Men

How TO OBTAIN A PATENT

Answers to Questions

on Page 33

1. By patenting the invention.
2. Send sketch or model and description with search fee to a registered patent attorney.
3. 1101 U. S.—1279 Foreign.
4. Abraham Lincoln.
5. 17 years.
6. It confers on patentee the exclusive right to make, sell and use the invention covered by the patent.
7. No. Pencil sketch and description will usually suffice.
8. A form on which an inventor may execute his sketch and description. When properly filled out it is documentary evidence of your conception of the invention.
9. Because a layman or a lawyer in general practice is not learned in patent office practice.
10. As soon as patent application covering the invention is filed in United States Patent Office and official receipt received.

CLARENCE A. O'BRIEN

Registered Patent Attorney
317-J Adams Building
Washington, D. C.

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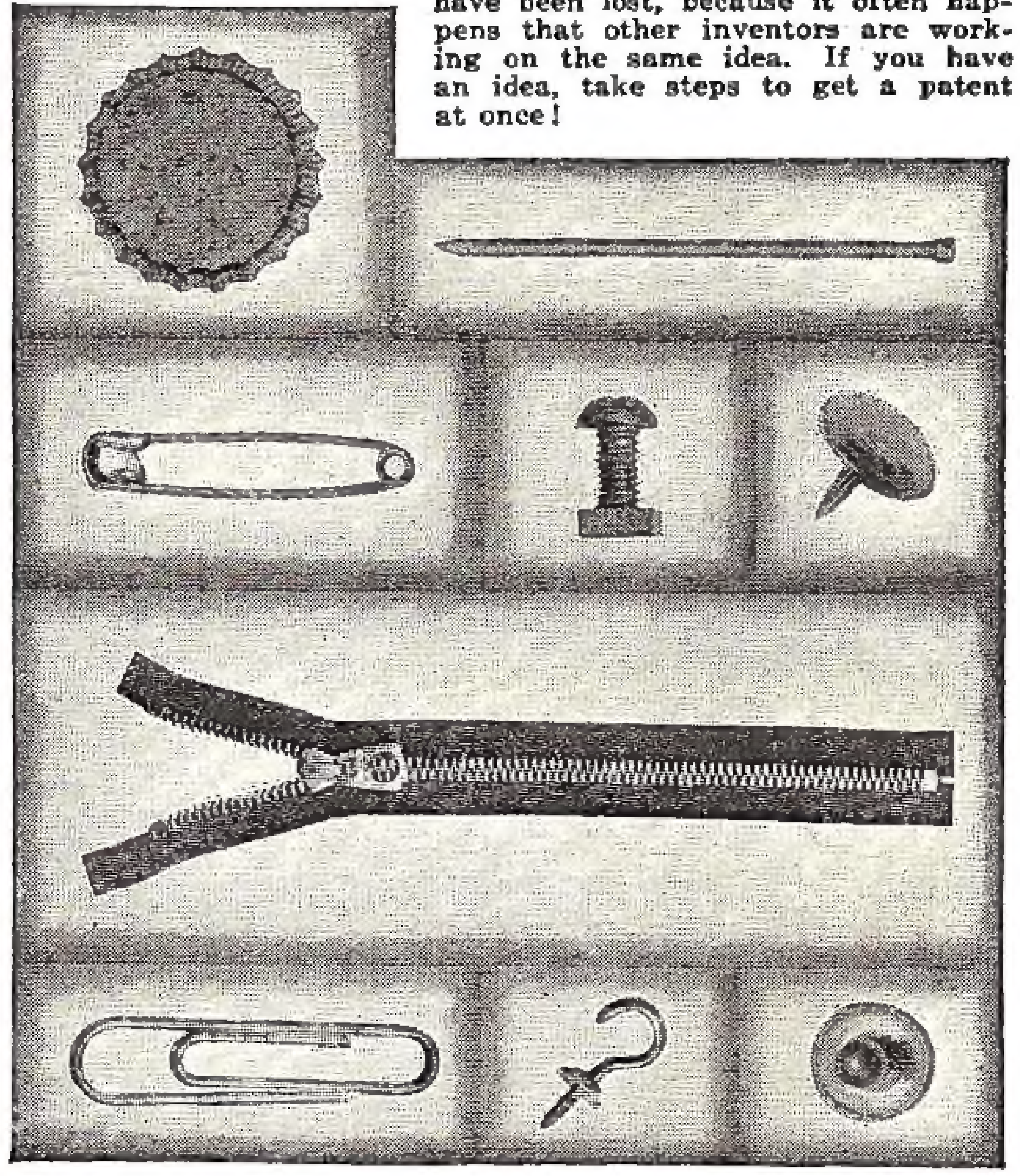
Small Ideas May Have Large Commercial Possibilities

If you hope to realize profits from your invention, you must protect it with a United States Government Patent. Otherwise you may find that all your time and labor have been lost, because it often happens that other inventors are working on the same idea. If you have an idea, take steps to get a patent at once!



THE Free Book shown here was prepared for inventors, to show them exactly what steps they must take to secure a PATENT. If you have an idea, you should send for this book AT ONCE. It will tell you exactly how an application for a Patent is made, what information you must furnish your attorney, and what steps he must take in order to protect your interests. Remember, inventing an article is one thing—securing the exclusive right to manufacture it, use it or sell it is another. Without a U. S. Patent, you cannot expect to reap the profits that your invention may make possible. Send at once for this book. After you get that, you'll know exactly what to do to protect yourself.

KNOW HOW to START KNOW EACH STEP to TAKE

Before Going Too Far With Your Ideas

Very often, the patent procedure is what we call a "simple" one—as illustrated here. My FREE BOOK "How to Obtain a Patent" describes what to do and how to go about it. Send for it by all means—let me urge, however, that you take the first step (STEP NO. 1 to right) without further delay. It will prevent wasted work, mis-steps, and going ahead "in the dark"—your whole patent procedure depends upon the first step.

Immediate Search Necessary

A Search at the U. S. Patent Office will disclose one of three things: That you have hit upon an entirely original idea—that you have suggested patentable improvements upon an existing invention—or that your invention has been anticipated throughout, and you should drop it. You should have this information at once. The Search Fee for the First Step (the search) is only $5. The next steps (the whole procedure of obtaining a patent) will be thoroughly explained to you in my FREE BOOK.

Send For This FREE BOOK

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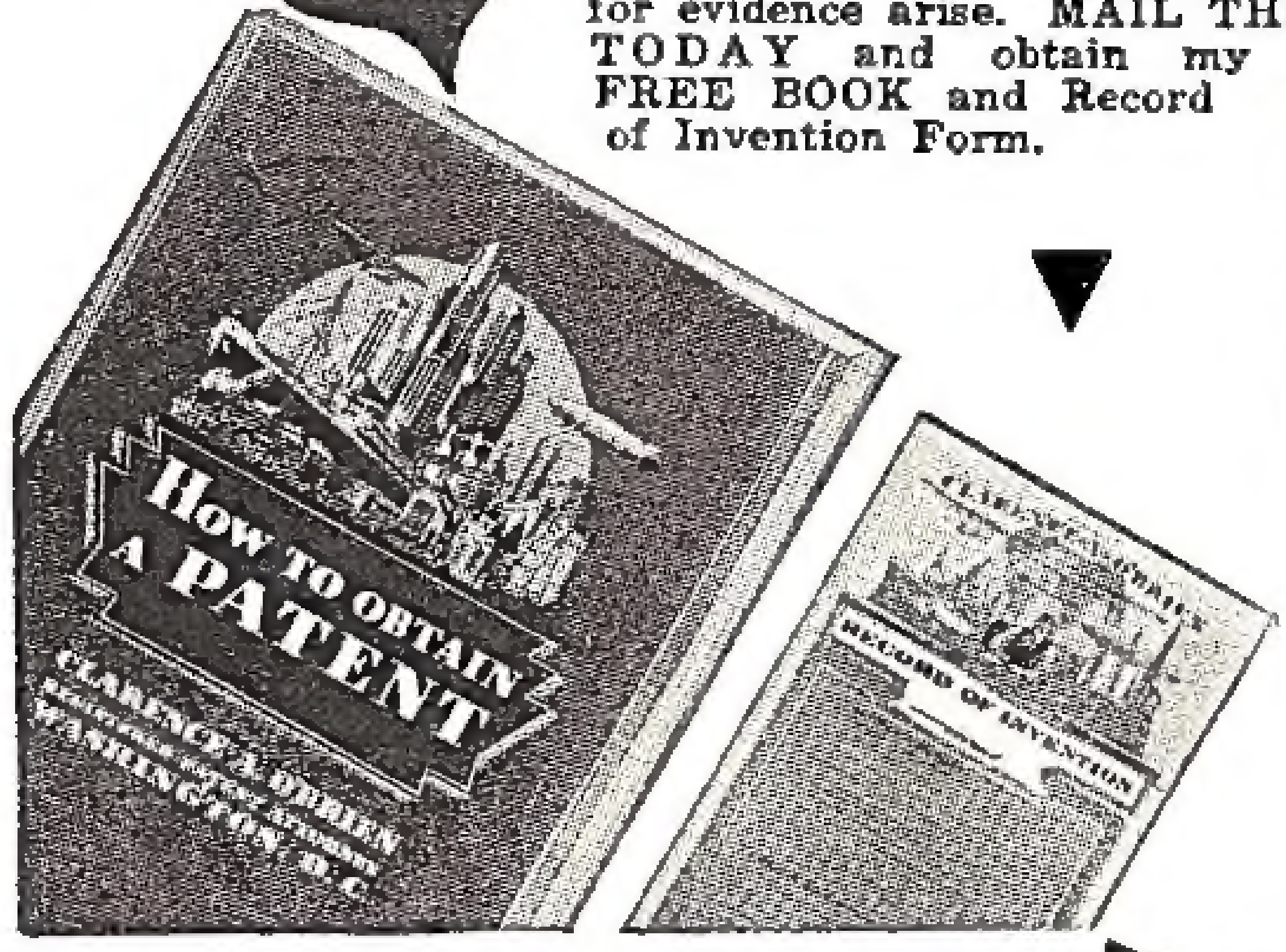
This FREE Record of Invention Form enables you to make in convenient form a sketch of your idea and have it witnessed in a manner of value to you should the occasion for evidence arise. MAIL THIS COUPON TODAY and obtain my FREE BOOK and Record of Invention Form.



STEP NO. 1

Make a rough pencil sketch of your invention, describe it fully, and send it to me for preliminary search through U. S. Patent Office—fee $5.00.

STEP NO. 2

My trained searchers will then make a preliminary search of the pertinent U. S. Patents to determine if your invention is probably patentable.

STEP NO. 3

My complete report of search and opinion on patentability will be mailed to you with copies of U. S. Patents that I consider nearest to your invention.

STEP NO. 4

If you decide to make patent application, for customary fees explained in my booklet, my draftsmen will make drawings and proper papers will be prepared for presentation of your invention to the Patent Examiner.

CLARENCE A. O'BRIEN
REGISTERED PATENT ATTORNEY
317-J ADAMS BUILDING
WASHINGTON, D. C.

Please send me your FREE BOOK, "How to Obtain a Patent," and your "Record of Invention" Form, without any cost or obligation on my part.

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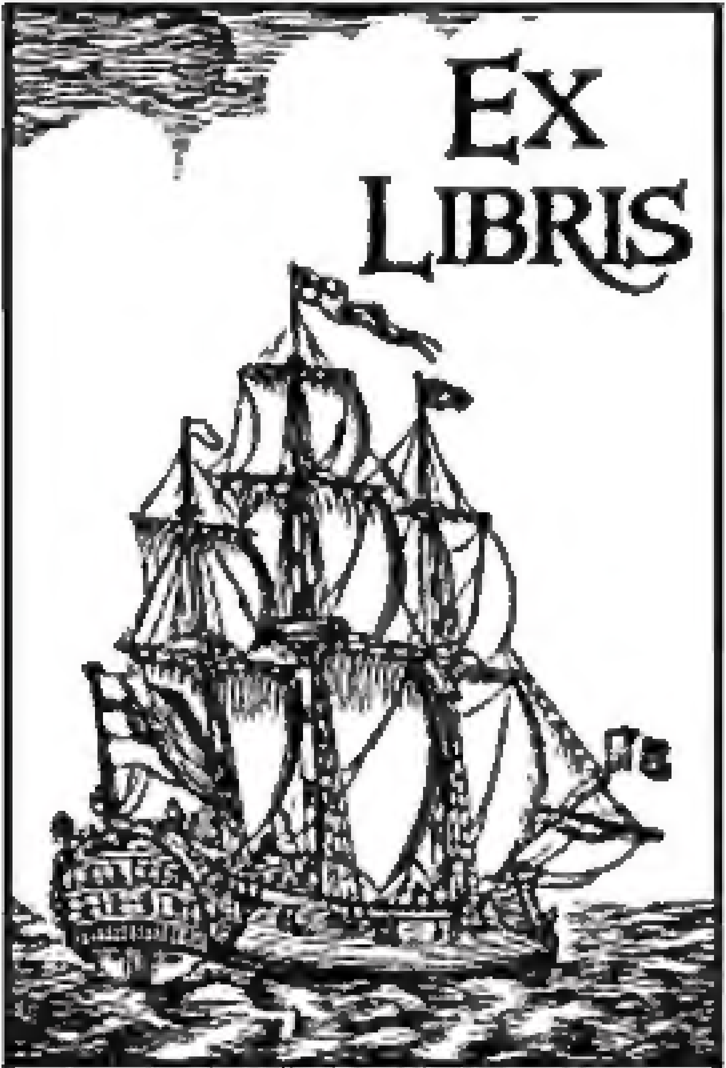

Anon. Malefactor